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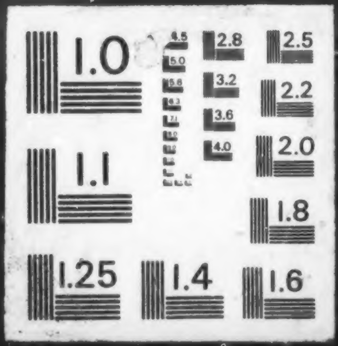
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Atmospheric Tracer Studies to Characterize the Transport and Dispersion of Pollutants in the California Delta Region. Volume II. Part A. Presentation of Tracer and Meteorological Data

California Inst. of Technology, Pasadena

Prepared for

California State Air Resources Board, Sacramento

2 Jun 77

PB 277 734

ATMOSPHERIC TRACER STUDIES TO CHARACTERIZE THE TRANSPORT AND DISPERSION OF POLLUTANTS IN THE CALIFORNIA DELTA REGION

VOLUME II, PART A:

PRESENTATION OF TRACER AND METEOROLOGICAL DATA

Contract No. ARB-A5-065-87

June 2, 1977

Prepared for:

State of California
Air Resources Board
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Eight tracer studies were conducted during four designated meteorological periods in 1976 to quantitatively determine the transport and dispersion characteristics of the air passing over a proposed industrial site in the Montezuma Hills. On the average, plumes emitted from the Montezuma Hills during the test periods were transported southeast. Estimates of tracer concentrations based upon the Gaussian plume model were found to be reasonably accurate. A nomograph was developed to permit rapid calculation of non-reactive pollutant concentrations from tracer data and pollutant emission rates; in the case of NO_2, the oxidation of NO to NO_2 was assumed to be rapid relative to the transport time. The nomograph was used to predict ground level concentrations of pollutants resulting from the projected emissions associated with the proposed Dow complex in the Montezuma Hills. A reasonable correlation was found to exist between the horizontal standard deviation of the wind, σy , and the horizontal dispersion parameter of the plume, σy. The correlation between $\sigma\theta$ and σy, along with air parcel trajectory analysis provide a means for extending the results of this study to other periods of the year.

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SUMMARY
VOLUME II, PARTS A AND B

It appears that the Montezuma Hills in the California Delta region may become the construction site for a series of large industrial facilities. The Delta region lies in a major channel for interbasin air flow between the San Francisco Bay Area and the Sacramento and San Joaquin Valleys of central California. For this reason, eight atmospheric tracer tests, utilizing SF_6 and $CBrF_3$ as dual tracers, were conducted during early September in order to probe the transport and dispersion of pollutants to and from the Montezuma Hills. An extensive air sampling system and meteorological observation system were employed in cooperation with Meteorology Research, Inc. (MRI) to measure as completely as possible all of the important variables associated with the tracer transport and dispersion. The tracer and pertinent meteorological data are presented in this report. A complete discussion of the meteorological and air quality data has been prepared by personnel from MRI; the MRI report is available under separate cover.

A brief summary of the results and conclusions are given in the Executive Summary, while a complete description of the study, the results, and conclusions are presented in Volume I. The tracer and meteorological data are presented graphically in Volume II, Part A; the same data are tabulated in Volume II, Part B. The tracer and meteorological data are also available as a computer card data deck.

Volume II, Parts A and B serve as the presentation and tabulation of the data base. For the sake of completeness and clearness, the data are graphically presented in several forms. Overview maps of automobile and airborne traverse tracer data and overview maps of the hourly averaged

tracer data provide a visual summary of the transport and dispersion of the tracers. The data are also presented individually by traverse and hourly sampling station.

ACKNOWLEDGMENT

We are very happy to acknowledge Charles L. Bennett and Jack K. Suder, both Senior Air Pollution Research Specialists with the California Air Resources Board, for their interest, helpful suggestions, and their help in coordinating this program.

The cooperation of William Anderson and David Bauer of the Dow Chemical Company was greatly appreciated. We wish to thank Art Schafer and L. Willard Richards of Rockwell International for their support.

We wish to thank John Pryshepa of Caltrans for the use of their portable anemometers. We thank Norman Baker for his support in providing airborne sampling and pertinent meteorological data. We thank Neal Moyer of the Air Resources Board for providing emission data, and Burton Okin of the Bay Area APCD for providing meteorological data.

Personnel from Meteorology Research, Incorporated provided meteorological support and also collected airborne samples. In particular, we wish to thank Ted B. Smith, Hans D. Giroux, and William Knuth for their cooperation throughout the field study.

We thank Joseph Spano of the San Joaquin APCD for his support in providing air sampling sites. We also thank the California State Police along with local firefighters for providing a number of air sampling sites. The Pinole police department was very cooperative in providing a release location. We express our thanks to the many people at APCD stations, private businesses, and homes who allowed us to operate the hourly air sampling systems.

We wish to thank C. Ray Dickson of the NOAA Laboratories in Idaho Falls, Idaho, for helpful suggestions regarding the development of chromatographic columns which were used to separate SF_6 and $CBrF_3$.

We thank Russell Bennett and Dave Suder for their help in obtaining air samples during the field study.

We wish to thank George Griffith, Henry Smith, Ray Reed, and John Yehle for their willingness to lend a hand when the need arose. We also thank Sharon ViGario for her patience in the typing of this report.

Finally, we thank the management of the California Holiday Lodge for permitting us to set up a small laboratory on their premises.

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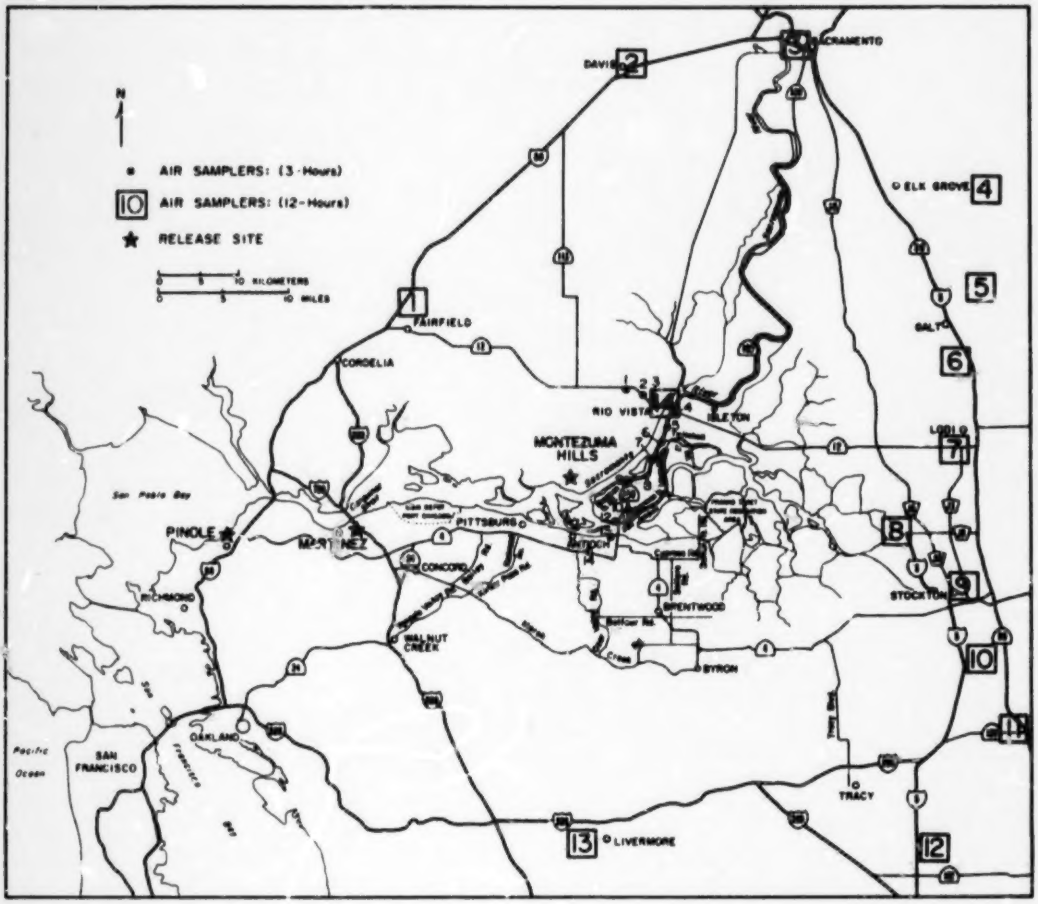
1. Introduction

This data volume presents the results of a series of atmospheric tracer tests conducted in the California Delta Region of Central California during September, 1976. Plans for large-scale industrialization of this area require an analysis of the impact upon air quality that would result from such industrial development. A necessary part of the impact analysis and the purpose of this work is the characterization of the transport and dispersion of gaseous pollutants through the Delta Region under typical and worst-case meteorological conditions.

Eight tracer releases were conducted from August 31, 1976, through September 14, 1976; during seven of the tests, either SF_6 or $CBrF_3$ was released from property owned by Dow Chemical in the Montezuma Hills. On the two days where $CBrF_3$ was used, SF_6 was released upwind of the Dow site from Martinez during Test 2 and from Pinole during Test 7. During the eighth test, SF_6 was released from Pinole. The test schedule and release rates are given in Table 1. A map of the region showing the release points is given in Figure 1.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AIR SAMPLERS: (3-Hours)
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS
2
SACRAMENTO
3
ELK GROVE
4
5
GALT
6
1
FAIRFIELD
CORDELIA
RIO VISTA
ISLETON
MONTEZUMA HILLS
LODI
7
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
8
STOCKTON
9
RICHMOND
BRENTWOOD
WALNUT CREEK
BYRON
10
11
Pacific Ocean
SAN FRANCISCO
OAKLAND
San Francisco Bay
TRACY
13
LIVERMORE
12

Figure 1. The California Delta Region

TABLE 1

TRACER RELEASE DATA

Date	Test	Location* of SF_6 Release	Release Period (PDT)	Release Rate (grams/sec)	Location of $CBrF_3$ Release	Release Period	Release Rate
8/31/76	1	Montezuma Hills	1200-1700	10.6 1.01 tons/day	-	-	-
9/2/76	2	Martinez	1100-1600	11.4 1.08 tons/day	Montezuma Hills	1300-1500	16.6 1.58 tons/day
9/5/76	3	Montezuma Hills	0000-0500	9.5 0.90 tons/day	-	-	-
9/6/76	4	Montezuma Hills	1800-2300	10.8 1.03 tons/day	-	-	-
9/9/76	5	Montezuma Hills	1130-1330	10.7 1.02 tons/day	-	-	-
9/10/76	6	Montezuma Hills	0600-1100	10.5 1.00 tons/day	-	-	-
9/13/76	7	Pinole	0600-1500	11.5 1.09 tons/day	Montezuma Hills	0900-1100	16.0
						1300-1400	16.0 1.52 tons/day
9/14/76	8	Pinole	0730-1300	10.9 1.04 tons/day	-	-	-

* Exact Tracer Release Locations: (1) Montezuma Hills: tracer was released from a truck parked by the Dow Chemical air quality monitoring station. The monitoring station is located approximately 4.3 Km east of Collinsville and 2 Km north of the Sacramento River. (2) Martinez: tracer was released from the parking lot of the Mountain View Sanitary District Sewage Plant at the end of Arthur Road. (3) Pinole: tracer was released from the parking lot of the Pinole police station on Pear Street.

2. Experimental Procedure

Tracers were released at approximately 5 meters above the ground from a truck parked at the release location. The release rate was monitored continuously using a large-volume rotameter. The average release rate was determined from measurements of the weight of the gas cylinders before and after each release.

Grab samples (10-second average) were taken in 30 cm^3 plastic syringes along automobile and airborne crosswind traverses at various downwind distances during the tracer releases. Air samples were also taken during vertical airborne spirals downwind of the release point. Hourly averaged air samples were taken at 14 locations in the region using 28 sequential, 12-hour air samplers. During most of the tests, samples were collected over 24 hours during the test period. Additional hourly averaged data were obtained at 14 locations immediately downwind of the Dow site during the first two tests using sequential, 3-hour air samplers. During the eight tests, 4508 automobile traverse samples, 1258 airborne traverse samples, 330 airborne spiral samples, 1721 hourly averaged 12-hour board samples, and 153 hourly averaged 3-hour board samples were collected; the total number of samples collected was 7970. The description of the automobile and airborne data is given in Table 3. The locations of traverse routes and the hourly sampling points are shown in Figure 1; Table 2 gives the location of each hourly sampling point.

Meteorological data, consisting of surface and upper air wind speed and direction data, mixing height estimations, cloud cover reports, and standard deviations of the horizontal wind, were collected from a variety of agencies or were obtained from Meteorology Research, Inc. (MRI).

Personnel from MRI were responsible for collection of airborne tracer data and air quality data as well as compilation and analysis of the available meteorological data. Wind data collection points are shown in Figure 2 and listed in Table 4.

Air samples were analyzed for SF_6 and $CBrF_3$ using electron capture gas chromatography. Details concerning the gas chromatographs are available in Volume I. Twelve chromatographs and two digital integrators were set up in a room at the California Holiday Lodge, Fairfield, California. Only eight of the chromatographs were used during the test; four were used to analyze for SF_6 alone and four were set up to analyze for both tracers. Field samples were returned each day to the lab for analysis. All of the samples from one test were analyzed before the next began. Calibration was done using an exponential dilution method. Calibration results show that concentrations down to 10^{-12} parts SF_6 per part air and 10^{-11} parts $CBrF_3$ per part air could be detected at a signal-to-noise ratio of better than 3 to 1. The gas chromatographs were calibrated before and after the field test period. During the tests, the instruments were cross-checked periodically for reproducibility. Details of the calibration results are given in Volume I.

TABLE 2

LOCATION OF 12-HOUR SEQUENTIAL AIR SAMPLERS

Station No.	Name	Distance South of Sacramento (km)
1	Fairfield, roof of California Holiday Lodge, 2100 N. Texas Street	--
2	University of California at Davis, Roof of Physics Building	--
3	Sacramento, 1025 P Street, Roof of State Police Offices	0
4	Elk Grove, 1 mile south of Wilton along Consummes Road, on the ground at power substation	18.0
5	Herald, 13020 West Lane	29.9
6	Collier Road, on the roof of the A & D Market, 0.5 miles west of Highway 99	39.3
7	Lodi, roof of maintenance building, corner of Ham and Kettleman Lane (Highway 12), 4.0 miles west of Highway 99	49.9
8	Hammer Lane, roof of Hammer Lane Fire Station, ~1 mile west of J8 and Hammer Lane junction	62.7
9	Stockton, roof of San Joaquin Health Center, 1601 East Hazelton Avenue	67.0
10	French Camp, roof of fire station, 1 mile southeast of I5, J9 junction along J9	76.0
11	Manteca, roof of old Manteca fire station, 1 mile east of 120, J3 junction	84.8
12	Tracy, roof of fire station, corner of Koster and Durham Ferry Road, 6 miles southeast of Tracy	99.3
13	Livermore, roof of Bay Area APCD Livermore Station, 2131 Railroad Avenue	--
14	Rio Vista, roof of Rio Vista fire station, 400 Main Street	--

TABLE 2 (cont.)

LOCATION OF 3-HOUR BOARDS

Station No.	Name	Distance N. of 4 & 160 Junction (km)
1	Cattey's Farm	26.4
2	Mark's Farm	23.8
3	Nursery (Cemetery)	22.2
4	McKinnon's Orchard	20.0
5	Alternate	17.9
6	Brannon Island State Recreation Area	15.9
7	Anderson	13.4
8	Domballion	10.9
9	Power Line #1	8.8
10	Power Line #2	7.4
11	State Fish and Game	6.1
12	State Highway Department	4.2
13	Wagner	1.6
14	Ventrini	3.4 (south of 4 & 160)

TABLE 3

AUTOMOBILE TRAVERSES

Date	Test No.	Traverse No.	Highway	Direction Traveled	Crossroad	Traverse Time (PDT)	Distance Traveled (km)	No. Samples
8/31/76	1	1	99,120,I205	South, west	Highway 12	1400-1450	58.7	74
		2	160	South	Twitchell Island Road	1420-1433	16.7	53
		3	160	North	Highway 4	1430-1445	14.8	47
		4	160	South	Twitchell Island Road	1515-1527	14.8	47
		5	I5,120,99	East, north	Interstate 205	1600-1652	68.3	86
		6	160	North	Highway 4	1630-1641	14.8	47
		7	99,120,I205	South, west	Boessow Road (Galt)	1701-1753	70.8	89
9/2/76	2	1	I680	South	Interstate 780	1130-1143	20.0	63
		2	I680	North	Highway 24 (Walnut Creek)	1215-1228	20.0	63
		3	4,160	East, north	Loveridge Road	1240-1350	25.7	17
		4	160	North	Highway 4	1400-1415	18.7	59
		5	160	South	Highway 12	1445-1503	18.7	59
		6	160	North	Highway 4	1515-1530	18.3	39
		7	Railroad Ave.	Southwest	Highway 4	1545-1635	29.8	69
		8	Empire Mine Road	South	Lone Tree Road	1625-1640	10.4	14

TABLE 3 (cont.)

AUTOMOBILE TRAVERSES

Date	Test No.	Traverse No.	Highway	Direction Traveled	Crossroad	Traverse Time (PDT)	Distance Traveled (km)	No. Samples
9/2/76 (cont.)	2 (cont.)	9	99,120,I205	South	Collier Road	1630-1715	63.6	80
		10	I580,I205,120, 99	East, north	Foothill Road (Dublin)	1630-1737	90.9	114
		11	I205,120,99	East, north	MacArthur Dr.	1731-1815	63.6	80
9/5/76	3	1	160	North	Highway 4	0100-0112	18.7	59
		2	99,120	South, west	Highway 12	0130-0210	63.6	80
		3	99	South, west	Boessow Road	0213-0259	63.6	80
		4	160	South	(Emmaton)	0240-0300	6.6	42
		5	4	West	Interstate 5	0247-0320	47.5	60
		6	160	South	Highway 12	0259-0306	5.1	65
		7	4	West	Interstate 5	0332-0415	63.6	80
		8	4,J3,12	East, north, west	Byron Road	0414-0545	74.8	93
		9	160	North	Highway 4	0430-0445	8.9	56
		10	12,J8	East, south	Highway 160	0432-0517	38.1	80
		11	160	South	Bean pot	0441-0450	6.1	77
		12	160	North	San Joaquin River	0502-0511	7.6	48
		13	12	East	Terminous	0630-0637	8.7	18
		14	J8	North	Highway 12	0637-0647	14.5	19

TABLE 3 (cont.)

AUTOMOBILE TRAVERSES

Date	Test No.	Traverse No.	Highway	Direction Traveled	Crossroad	Traverse Time (PDT)	Distance Traveled (km)	No. Samples
9/6/76	4	1	160	South	Highway 12	1928-1946	18.7	59
		2	99,120,I205	South, west	Highway 12	2130-2217	63.6	80
		3	160	South	Bean pot	2132-2140	6.4	80
		4	99,120,I205	South, west	Kettleman Lane	2200-2246	63.6	80
		5	160	North	San Joaquin River Bridge	2214-2222	6.3	79
		6	I205,120,99	East, north	Tracy Blvd.	2232-2320	63.6	80
		7	I205,120,99	East, north	Patterson Pass Rd. (1.4 mi e of)	2315-2400	63.6	80
9/9/76	5	1	4	East	Railroad Ave.	1255-1315	15.0	94
		2	4, 160	East, north	Railroad Ave.	1314-1330	25.4	80
		3	Sellers Rd., Cypress Rd., Bethel Island Rd.	North, east, north	Highway 4	1349-1417	14.9	38
		4	Balfour Rd.	East	Deer Valley Rd.	1351-1405	12.1	26
		5	Marsh Creek Rd.	East	Deer Valley Rd.	1356-1428	35.7	75
		6	160,4	South, west	Twitchell Island Road	1359-1416	25.4	80
		7	Balfour Road	West	Byron Highway	1413-1426	12.1	26
		8	Balfour Road	East	Deer Valley Rd.	1436-1450	12.1	26

TABLE 3 (cont.)

AUTOMOBILE TRAVERSES

Date	Test No.	Traverse No.	Highway	Direction Traveled	Crossroad	Traverse Time (PDT)	Distance Traveled (km)	No. Samples
9/10/76	6	1	Sherman Island Road	Southwest	160	0800-0815	5.8	37
		2	160	South	12	0740-0753	15.9	100
		3	99,120,I205	South, west	Highway 12	1001-1051	63.6	80
		4	Sherman Levee Road	South	Highway 160	1023-1033	9.5	60
		5	99	South, west	Highway 12	1030-1115	63.6	80
		6	160	North	San Joaquin River Bridge	1022-1033	6.4	80
		7	160	North	San Joaquin River Bridge	1103-1112	6.4	80
		8	I205,120,99	East, north	Patterson Pass Rd. (1.5 mi e of)	1105-1203	63.6	80
		9	I205,120,99	East, north	Tracy Blvd.	1145-1230	63.6	80
9/13/76	7	1	24,I680,I780	East, north	Highway 13	0924-0956	48.3	100
		2	Sherman Island Road	Northeast	S. end of Sherman Island Rd.	0940-1155	7.0	88
		3	12,160,4	East, south, west	Interstate 80	1113-1217	75.6	48
		4	I780,I680	South	Interstate 80	1130-1146	24.9	32
		5	I580,I205,120	East	Vasco Road	1335-1458	138.4	87
		6	I780,I680,24	South, west	Interstate 80	1340-1414	51.5	33

TABLE 3 (cont.)
AUTOMOBILE TRAVERSES

Date	Test No.	Traverse No.	Highway	Direction Traveled	Crossroad	Traverse Time (PDT)	Distance Traveled (km)	No. Samples
9/13/76 (cont.)	7 (cont.)	7	I580	East	Highway 238	1429-1451	33.8	22
		8	I80,17,238, I580 Vasco, Walnut 4,160,12	S,S,E,E N,N N,N,W	W. Texas (Fairfield)	1450-1706	191.5	120
		9	I580	West	Highway 84	1458-1532	33.8	22
		10	24,I680,I780	East, north	Interstate 580	1537-1611	53.1	34
		11	99,120,I205, I580	S, west	Mack Road	1654-1820	132.0	83
		12	I580,17	West, north	Highway 84	1835-1901	25.7	17
9/14/76	8	1	I680	South	Interstate 80	0906-0931	38.6	49
		2	I680	North	Highway 24	0941-1007	38.6	49
		3	12,160,4,24	E,S,W,S	W. Texas Ave. (Fairfield)	1047-1151	91.7	58
		4	I680	North	Highway 24 (Walnut Creek)	1154-1220	38.6	49

TABLE 3 (cont.)

AIRBORNE TRAVERSES AND SPIRALS

Date	Test No.	Traverse No.	Traverse Path and Direction	Altitude (meters, MSL)	Traverse Time	Distance Traveled (km)	No. Samples
9/10/76	6	1	VACA-Dixon Airport south to Isleton	305	0934-0946	38.1	11
		2	Isleton s. to 4 mi. e. of Brentwood	305	0950-1005	24.3	59
		3	4 mi. e. of Brentwood s. to I580-I205 junction	305	1012-1020	23.1	9
		4	I580-I205 junction n. to 4 mi. e. of Brentwood	183	1044-1052	23.1	8
		5	4 mi. e. of Brentwood n. to Isleton	183	1054-1107	24.3	52
		6	Isleton n. to VACA-Dixon Airport	183	1109-1122	38.1	14
		7	Isleton s. to 4 mi. e. of Brentwood	427	1140-1153	24.3	25
		8	Junction S.P.T. Co. Railroad & I580 n. to I5 and I205	305	1229-1235	17.8	7
		9	I5-I205 n. to Wilson Way & Highway 99	305	1238-1251	27.5	27
		10	Sacramento Executive Airport s. to Ripon	183	1000-1039	94.1	40
		11	Ripon n. to Sacramento Executive Airport	183	1100-1139	94.1	40
		12	Sacramento Executive Airport s. to Ripon	183	1200-1239	94.1	40

TABLE 3 (cont.)

AIRBORNE TRAVERSES AND SPIRALS

Date	Test No.	Traverse No.	Traverse Path and Direction	Altitude (meters, MSL)	Traverse Time	Distance Traveled (km)	No. Samples
9/10/76 (cont.)	6 (cont.)	13	Ripon n. to Sacramento Executive Airport	183	1300-1339	94.1	40
9/13/76	7	1	Cordelia s. to I680 and Highway 24 (Walnut Creek)	427	0736-0748	36.5	50
		2	I680 and Highway 24 n. to Cordelia	305	0757-0810	36.5	53
		3	Cordelia s. to I680 and Highway 24	183	0819-0832	36.5	53
		4	Cordelia s. to I680 and Highway 24	427	0906-0918	36.5	12
		5	I680 & 24 to Cordelia	305	0925-0938	36.5	53
		6	Cordelia to I680 & 24	183	0945-0958	36.5	53
		7	VACA-Dixon Airport s. to Isleton	183	1112-1324	38.1	26
		8	Isleton s. to I580 & I205	183	1327-1343	47.0	62
		9	I205 & I580 n. to Isleton	305	1348-1404	47.0	68
		10	Isleton n. to VACA-Dixon Airport	305	1409-1422	38.1	27
		11	VACA-Dixon Airport s. to Isleton s. to I580 & I205	427	1428-1456	85.1	55
		12	Livermore Airport East to I5-205	457	1759-1812	44.1	27
		13	I5 & I205 Northeast to Stockton Airport	457	1815-1822	16.2	13

TABLE 3 (cont.)

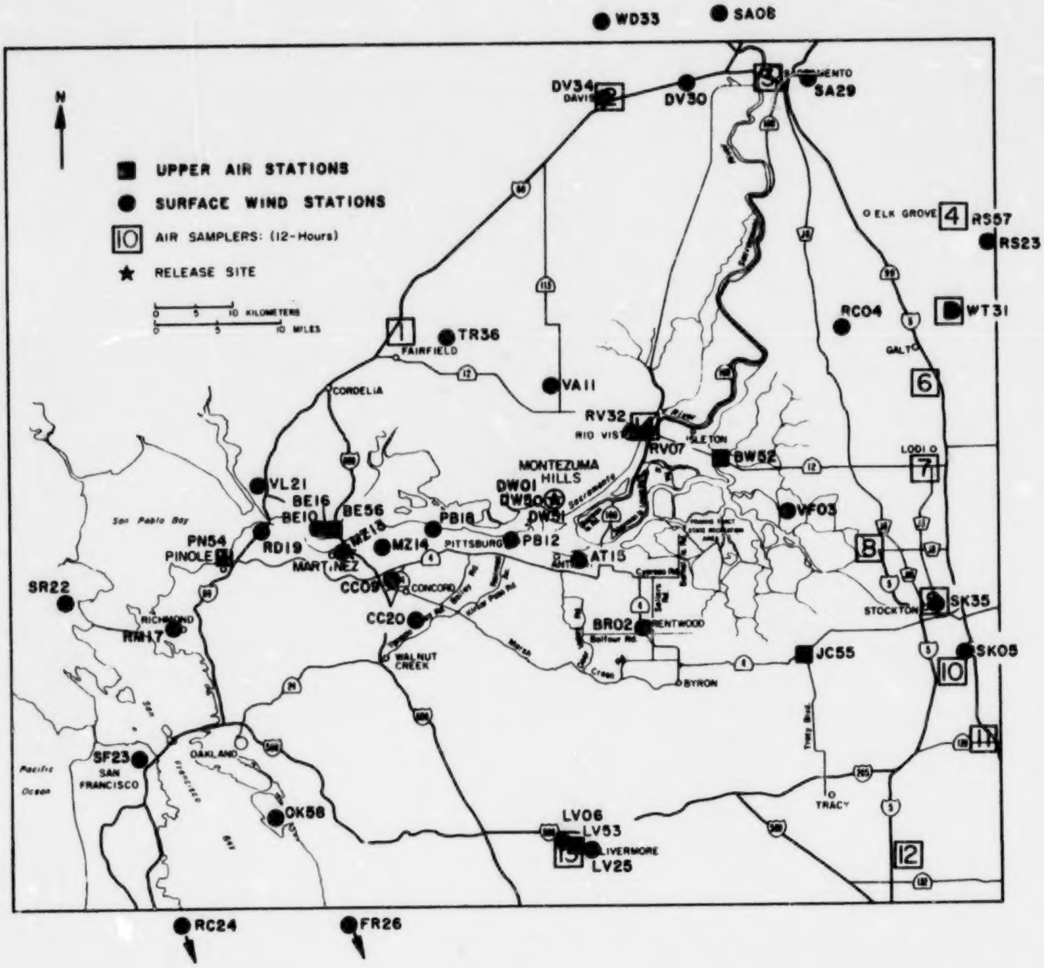
AIRBORNE TRAVERSES AND SPIRALS

Date	Test No.	Traverse No.	Traverse Path and Direction	Altitude (meters, MSL)	Traverse Time	Distance Traveled (km)	No. Samples	
9/13/76 (cont.)	7 (cont.)	14	Stockton Airport n. to 5.7 mi ssw of Sacramento Executive Airport	457	1850-1912	66.4	45	
9/14/76	8	1	I680-Highway 24 (Walnut Creek) n. to Cordelia	366	0826-0839	36.5	53	
		2	Cordelia s. to I680-Highway 24	274	0843-0856	36.5	53	
		3	I680-24 n. to Cordelia	183	0858-0911	36.5	53	
		4	Cordelia s. to I680-24	427	0942-0955	36.5	27	
		5	I680-24 n. to Cordelia	305	0959-1012	36.5	52	
		6	Cordelia s. to I680-24	183	1016-1028	36.5	51	
				SPIRALS				ΔH (meters)
9/10/76	6	1	Over Frank's Tract Recreation Area	914 to 488	1158-1203	-	8	61
		2	Over Frank's Tract Recreation Area	472 to 30	1203-1208	-	31	15
9/13/76	7	1	0.5 mi n. of the Port Chicago Naval Magazine	914 to 488	0845-0850	-	8	61
		2	0.5 mi n. of the Port Chicago Naval Magazine	472 to 15	0850-0854	-	33	15

TABLE 3 (cont.)

AIRBORNE TRAVERSES AND SPIRALS

Date	Test No.	Traverse No.	Traverse Path and Direction	Altitude (meters, MSL)	Traverse Time	Distance Traveled (km)	No. Samples	ΔH (meters)
9/13/76 (cont.)	7 (cont.)	3	0.5 mi n. of the Port Chicago Naval Magazine	914 to 488	1008-1013	-	8	61
		4	0.5 mi n. of the Port Chicago Naval Magazine	457 to 0	1013-1017	-	31	15
		5	Rio Vista	1829 to 914	1518-1526	-	16	61
		6	Rio Vista	884 to 30	1526-1534	-	29	31
		7	Tracy	1829 to 914	1553-1559	-	16	61
		8	Tracy	884 to 91	1559-1603	-	27	31
		9	Stockton	1524 to 762	1832-1838	-	14	61
		10	Stockton	732 to 30	1838-1844	-	24	31
9/14/76	8	1	0.5 mi n. of Port Chicago Naval Magazine	1067 to 457	0921-0926	-	11	61
		2	0.5 mi.n. of Port Chicago Naval Magazine	442 to 15	0926-0930	-	29	15
		3	0.5 mi n. of Port Chicago Naval Magazine	1372 to 457	1039-1044	-	16	61
		4	0.5 mi n. of Port Chicago Chicago Naval Magazine	442 to 15	1044-1049	-	29	15



UPPER AIR STATIONS
SURFACE WIND STATIONS
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
N
WD33
SA08
DV34
DAVIS
DV30
SA29
ELK GROVE
RS57
RS23
WT31
RC04
GALT
TR36
FAIRFIELD
CORDELIA
VA11
RV32
RIO VISTA
RV07
BW52
LODI
MONTEZUMA HILLS
DW01
DW50
DW51
VL21
BE16
BE10
BE56
MZ13
PB18
PN54
PINOLE
RD19
MZ14
PITTSBURG
PB12
AT15
VF03
MARTINEZ
CC09
CONCORD
SR22
RICHMOND
RM17
CC20
BR02
BRENTWOOD
STOCKTON
SK35
JC55
SK05
WALNUT CREEK
BYRON
SF23
SAN FRANCISCO
OAKLAND
TRACY
OK58
LV06
LV53
LIVERMORE
LV25
San Pablo Bay
Pacific Ocean
RC24
FR26
1
2
3
4
6
7
8
10
11
12
13

Figure 2. Location of surface wind and upper air data stations.

TABLE 4

WIND DATA STATIONS AND DESCRIPTION OF DATA

Station	Station Code	Description of Data
1 Dow Surface (Rockwell)	DW01	Hourly averaged wind speed, wind direction at 5-minute intervals
2 Brentwood (Rockwell)	BR02	Hourly averaged wind speed, wind direction at 5-minute intervals
3 Venice Ferry (MRI)	VF03	Hourly averaged speed and direction
4 Rio Cosumnes (MRI)	RC04	Hourly averaged speed and direction
5 Stockton (NWS)	SK05	Single hourly observations
6 Livermore (NWS)	LV06	Single hourly observations
7 Rio Vista (NWS)	RV07	Single hourly observations
8 Sacramento (Metropolitan Airport) (NWS)	SA08	Single hourly observations
9 Concord (Buchanan Field) (NWS)	CC09	Single hourly observations
10 Benicia (BAAPCD)	BE10	Hourly averaged speed and direction
11 Voice of America Radio Tower	VA11	Hourly averaged speed and direction
12 Pittsburg PG&E Company	PB12	Hourly averaged speed and direction
13 Martinez Shell Oil	MZ13	Hourly averaged speed and direction
14 Martinez Lion Oil	MZ14	Hourly averaged speed and direction
15 Antioch Fibreboard	AT15	Hourly averaged speed and direction

TABLE 4 (cont.)

Station	Station Code	Description of Data
16 Benicia Exxon	BE16	Hourly averaged speed and direction
17 Richmond Allied Chemical	RM17	Hourly averaged speed and direction
18 Pittsburg Allied Chemical	PB18	Hourly averaged speed and direction
19 Rodeo Union Oil	RD19	Hourly averaged speed and direction
20 Concord BAAPCD	CC20	Hourly averaged speed and direction
21 Vallejo BAAPCD	VL21	Hourly averaged speed and direction
22 San Rafael BAAPCD	SR22	Hourly averaged speed and direction
23 San Francisco BAAPCD	SF23	Hourly averaged speed and direction
24 Redwood City BAAPCD	RC24	Hourly averaged speed and direction
25 Livermore BAAPCD	LV25	Hourly averaged speed and direction
26 Fremont BAAPCD	FR26	Hourly averaged speed and direction
27 Pittsburg BAAPCD	PB27	Hourly averaged speed and direction
28 Rancho Seco Nuclear Power Plant Site	RS28	Hourly averaged speed and direction
29 Sacramento Caltrans	SA29	Hourly averaged speed and direction
30 Davis Caltrans	DV30	Hourly averaged speed and direction

TABLE 4 (cont.)

Station	Station Code	Description of Data
31 Wilton Caltrans	WT31	Hourly averaged speed and direction
32 Rio Vista Yolo-Solano APCD	RV32	3-Hourly averaged speed and direction
33 Woodland Yolo-Solano APCD	WD33	2-Hourly averaged speed and direction
34 Davis Yolo-Solano APCD	DV34	2-Hourly averaged speed and direction
35 Stockton San Joaquin APCD	SK35	Miles of wind/hr by quadrant
36 Travis Travis Air Force Base	TR36	Single hourly observations

TABLE 4 (cont.)

UPPER AIR WIND SPEED AND DIRECTION MEASUREMENTS

Station	Station Code	Date and Time (PDT)	
Dow Tower	DW50	Continuous 8/31/76 through 9/14/76	
Dow Pibal	DW51	8/31/76	1100-1700
		9/2/76	1000-1700
		9/5/76	0000-0500
		9/6/76	1700-2300
		9/9/76	1100-1400
		9/10/76	0700-1200
		9/13/76	0700-1700
		9/14/76	0800-1600
B & W Resort Pibal	BW52	8/31/76	1000-1800
		9/2/76	1000-1800
		9/5/76	0000-0600
		9/6/76	1600-2400
		9/9/76	1000-1400
		9/10/76	0800-1900
Livermore Pibal	LV53	8/31/76	1000-1800
		9/2/76	0900-1000
		9/9/76	0900-1900
		9/10/76	1100-1800
		9/13/76	0800-1800
		9/14/76	0800-1500
Pinole Pibal	PN54	9/13/76	0600-1600
		9/14/76	0600-1700
Junction J2 & CAL4 Pibal	JC55	9/14/76	1600-1900
Benicia Pibal	BE56	9/10/76	1400
Rancho Seco Nuclear Power Plant Site Tower	RS57	Continuous at 200 feet, hourly standard deviation of the wind	
Oakland International Airport Pibal	OK58	8/31/76 through 9/14/76 2 measurements per day	

3. Presentation of the Tracer Data

This data volume (Volume II) serves as a reference to Volume I of this report where the analysis of the tracer and meteorological data along with detailed accounts of the experimental procedures are given. The tracer data are given as parts per trillion (ppt) or part tracer/10^{-12} parts air by volume; unless otherwise indicated all concentrations are for SF_6. All times, unless otherwise indicated, are in Pacific Daylight Time (PDT). Wind speeds and direction are given in meters/sec and degrees, respectively. Atmospheric stability conditions are given in terms of Pasquill stability classes as explained by Turner (1970).

3.1 Relation of Tracer Data to Industrial Pollutant Emissions

The measured tracer concentrations obtained during the field study can be converted to a specified pollutant concentration using the nomographs in Figures 3 and 4. In order to use the nomographs, the value of K, the ratio of the pollutant molecular weight (in grams) to the pollutant's existing or projected emission rate (in tons/day) must be specified. Any tracer concentration can then be converted to the concentration of the pollutant by picking the point along the specified K-line where the tracer concentration occurs. As examples, the projected emissions of NO_x (in terms of NO_2), SO_2, and CO associated with the Dow complex have been used to specify the K values which are given in Table 5 and shown in the nomographs. A concentration of 100 ppt SF_6 converts to 2.93 ppb NO_x (as NO_2), 0.242 ppb SO_2, and 4.99 ppb CO. Restrictions regarding the conversion procedure are discussed in Volume I. A summary of the preliminary estimates of emissions from

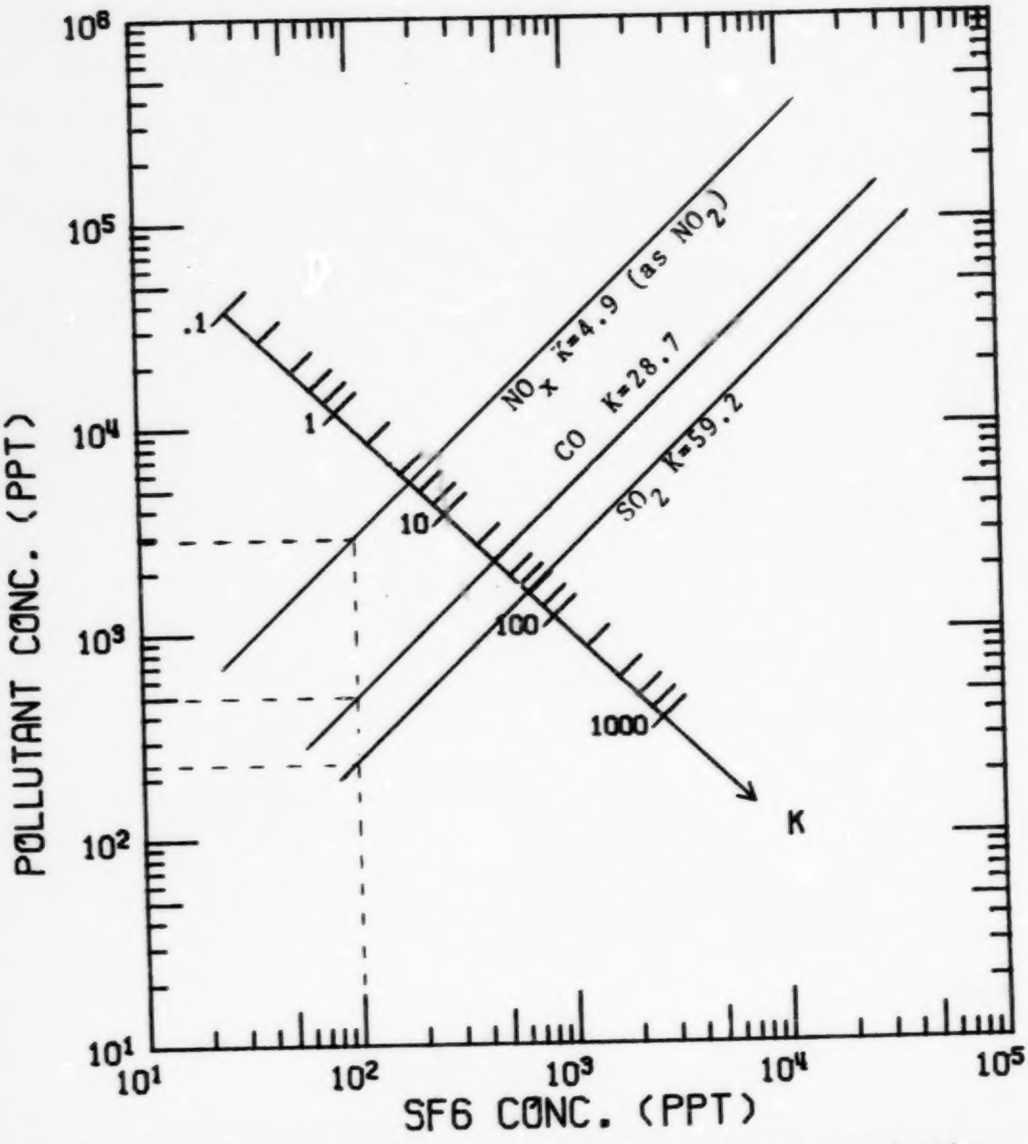


Figure 3. Conversion nomograph for converting SF_6 tracer concentrations measured during the field study to pollutant concentrations. K = (pollutant molecular wt., grams) / (pollutant emission rate, tons/day). Values of K shown above are based on projected pollutant emissions from the Montezuma Hills Dow chemical complex. Dashed line indicates the corresponding tracer-to-pollutant concentration conversions.

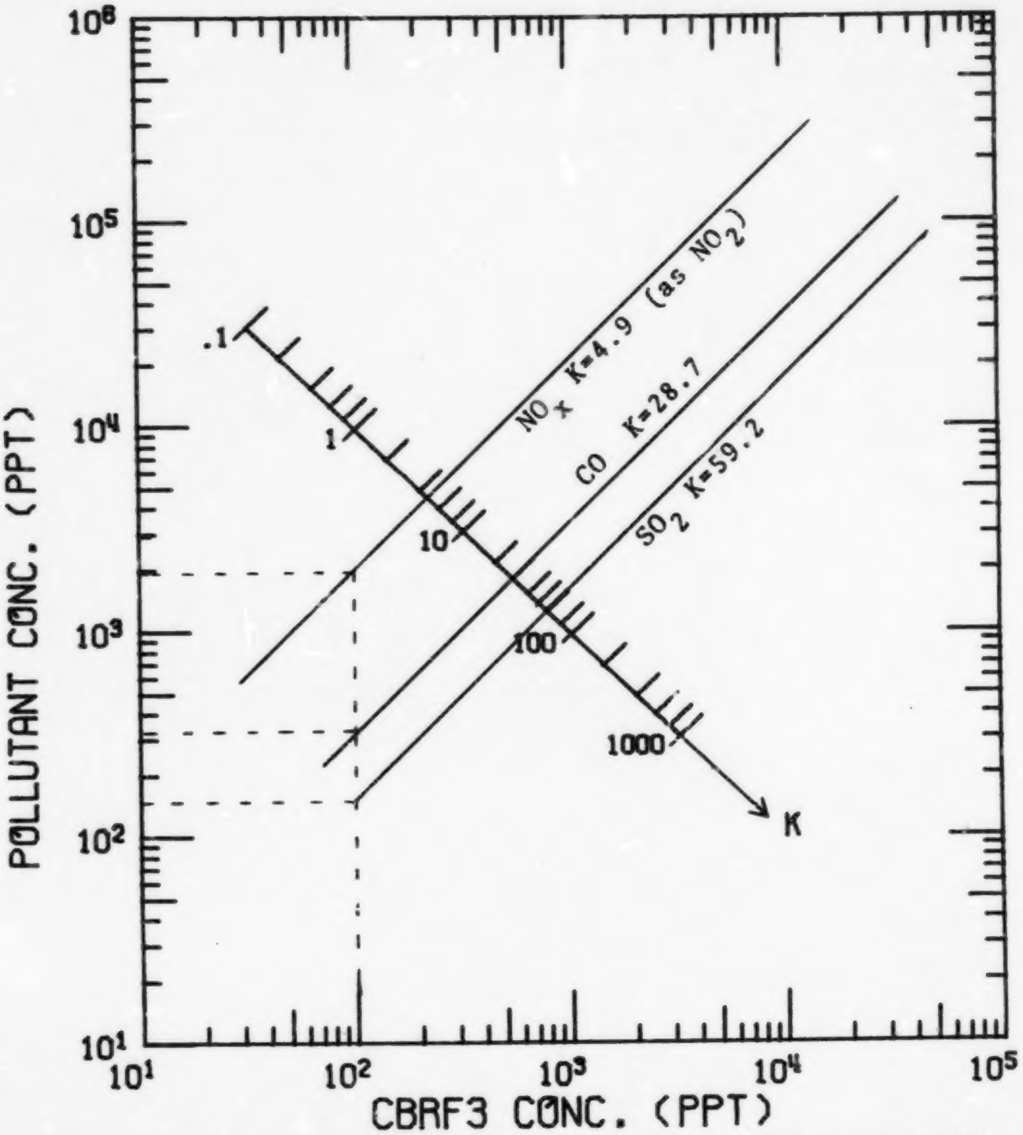


Figure 4. Conversion nomograph for converting $CBrF_3$ tracer concentrations measured during the field study to pollutant concentrations. K = (pollutant molecular wt, grams) / (pollutant emission rate, tons/day). Values of K shown above are based on projected pollutant emissions from the Montezuma Hills Dow chemical complex. Dashed line indicates the corresonding tracer-to-pollutant concentrations conversions.

TABLE 5

NOMOGRAPH K-VALUES FOR PROJECTED DOW EMISSIONS*

$$K \equiv \frac{\text{Mol. Wt. of Pollutant (grams)}}{\text{Emission Rate (tons/day)}} = \frac{MW_p}{RR_p}$$

Pollutant	MW_p (grams)	RR_p* (tons/day)	K Dow only	RR_p** Dow + Turbine	K Dow + Turbine
NO_x (as NO_2)	46	9.41	4.89	23.10	1.99
SO_2	64	1.08	59.2	1.252	51.12
CO	28	0.976	28.68	4.796	5.84
NMHC+	-	1.516	-	2.900	-

MW_p = molecular weight of pollutant (grams/mole)

RR_p = emission rate of pollutant (tons/day)

* Projected Dow emissions for Montezuma Hills chemical complex from Moyer (1977).

** Plans concerning the development of the Dow project indicated a 146 megawatt gas turbine might be necessary as an on-site power source. The emissions resulting from the operation of such a turbine were obtained from Moyer (1977).

+ Values of K for nonmethane hydrocarbons (NMHC) have not been calculated because the complex reaction mechanisms prevent simple descriptions of the rates of conversion.

the Dow project are given in Table 6 (Moyer, 1977).

The nomographs are based upon the following equation:

$$[P] = [T] \cdot \frac{RR_T}{MW_T} \cdot \frac{MW_P}{RR_P} = [T] \cdot \frac{K_T}{K_P}$$

where [P] is the pollutant concentration in ppt, [T] is the tracer concentration in ppt, RR_T and RR_P are the tracer and pollutant release rates in tons/day, respectively, and MW_T and MW_P are the associated molecular weights in grams. The terms K_T and K_P are the respective ratios of tracer and pollutant molecular weights to emission rates. K-lines shown in the nomographs are based on the average tracer release rates during the eight tests. This introduces only a small error (4%) since the release rates were relatively constant from test to test.

3.2 Overview of Tracer Data

The following maps provide an overview of the transport and dispersion of the tracer during the releases. Tracer concentrations from automobile and airborne traverses are plotted as a function of distance along the traverse in kilometers; note that the concentration scales differ from traverse to traverse. Wherever $CBrF_3$ and SF_6 were both observed, two plots of the traverse are shown. Overviews of the hourly averaged (12-hour board) data are shown in 12-hour bar graphs of the data for each sampling location.

TABLE 6

PRELIMINARY DOW MONTEZUMA AIR EMISSION ESTIMATIONS

Name of Process Facility	NO_x (as NO_2)	SO_2 (lb/hr)	CO	NMHC non-methane HC	TSP total suspended particles
1. Styrene	29.6	4.6	4.4	6.9	2.2
2. Ethylene	557.2	59.26	48.2	20.2	23.2
3. Benzene	23.4	3.6	3.5	1.6	1.8
4. Ethyl Benzene	4.3	0	0.5	12.37	0.3
5. Cumene	30.7	4.6	4.5	12.07	2.2
6. Phenol	31.4	5.0	4.7	5.3	2.3
7. HPDE	3.8	0	0.3	16.4	0.2
8. LDPE	0	0	0	37.5	0
8. Propylene Oxide	26.4	4.2	3.9	1.9	2.0
10. Caustic	32.9	5.0	4.9	1.1	2.4
11. VCM	40.1	3.8	5.4	9.0	2.8
12. Track & Car Loading	0	0	0	1.0	0
13. Incinerator	4	0	1.0	0	1.0
14. Ship Dock	0.7	0	0.05	1.0	0.04
TOTALS	784.5	90.06	81.35	126.34	40.44
TOTALS (tons/day)	9.414	1.081	0.9762	1.516	0.4853

146 MW CONSTANT LOAD NATURAL GAS-FIRED TURBINE

Emission factors (lb/hr rated load)

	NO_x	SO_2	CO	HC	TSP
	7.81	0.098	2.18	0.79	0.27
Emissions (lb/hr)	1140.3	14.3	318.3	115.3	39.4
(tons/day)	13.68	0.1716	3.820	1.384	0.4728

TOTAL EMISSIONS (PLANT + GAS TURBINE)

	NO_x	SO_2	CO	HC	TSP
lb/hr	1924.8	104.36	399.65	241.64	79.84
tons/day	23.10	1.252	4.796	2.900	0.958

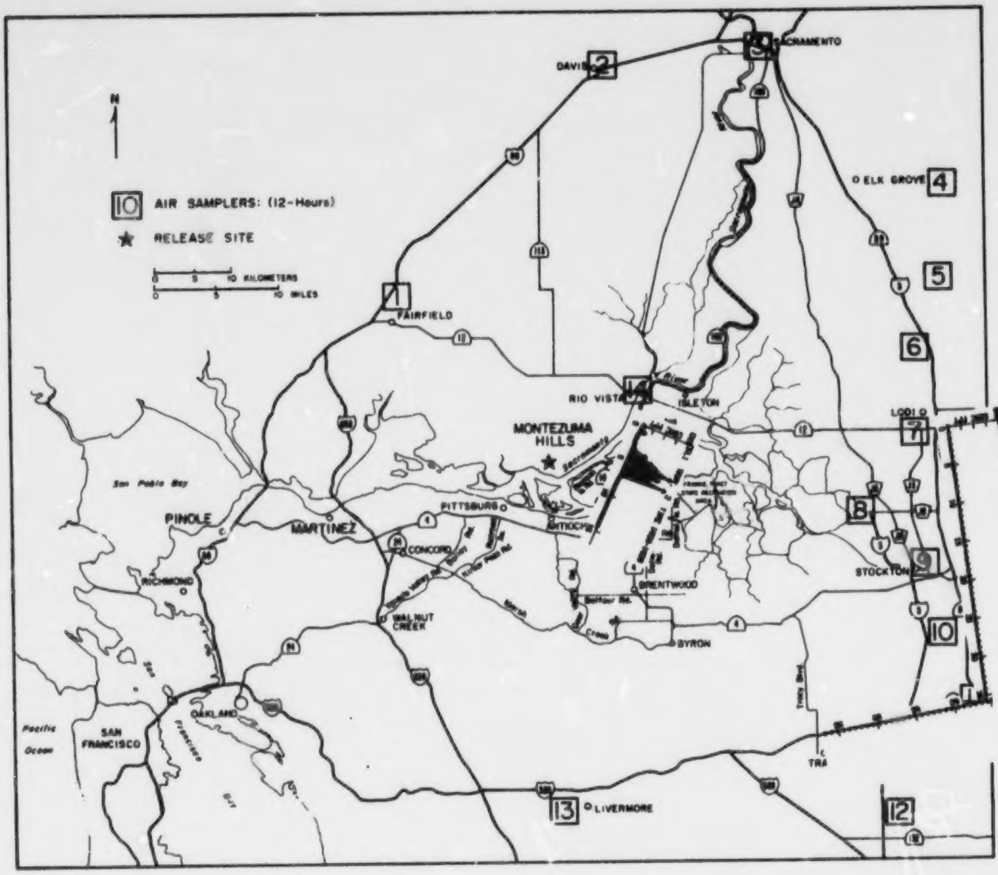

N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS 2
SACRAMENTO 3
ELK GROVE 4
5
6
LODI 7
8
STOCKTON 9
10
12
LIVERMORE 13
RIO VISTA 14
1
FAIRFIELD
ISLETON
MONTEZUMA HILLS
Sacramento
River
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
Balfour Rd.
BYRON
OAKLAND
SAN FRANCISCO
Pacific Ocean
San Francisco Bay
TRA

Figure 5.

TEST 1

8/31/76

Auto Traverses:

1 1400 - 1450 PDT, SF_6(max) = 0 ppt

2 1420 - 1433 PDT, SF_6(max) = 611 ppt

SF_6 released from the Montezuma Hills from 1200-1700 PDT.

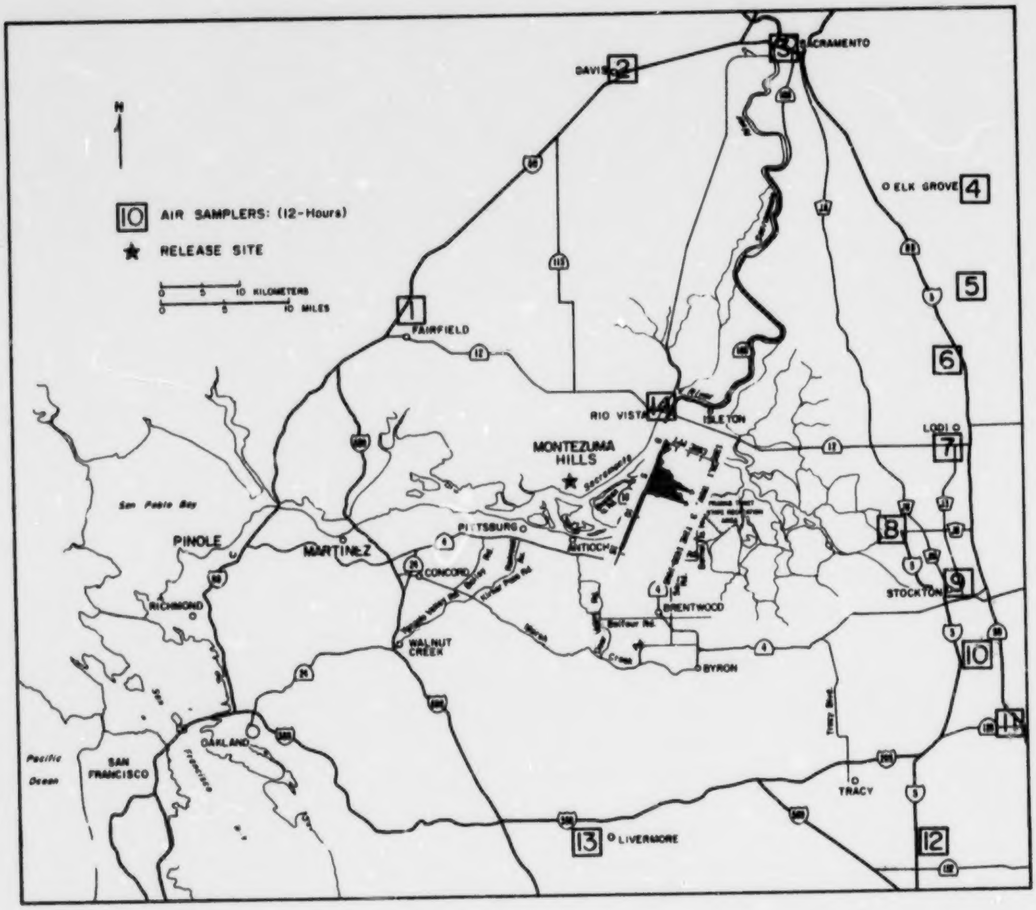

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
1
2
3
4
5
6
7
8
9
10
11
12
13
14
SACRAMENTO
DAVIS
ELK GROVE
FAIRFIELD
RIO VISTA
ISLETON
MONTEZUMA HILLS
LODI
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
Balfour Rd.
BYRON
STOCKTON
OAKLAND
SAN FRANCISCO
Pacific Ocean
TRACY
Tracy Blvd.
LIVERMORE
Sacramento
River

Figure 6.

TEST 1

8/31/76

Auto Traverse:

3 1430 - 1445 PDT, SF_6(max) = 1013 ppt

SF_6 released from the Montezuma Hills from 1200-1700 PDT.

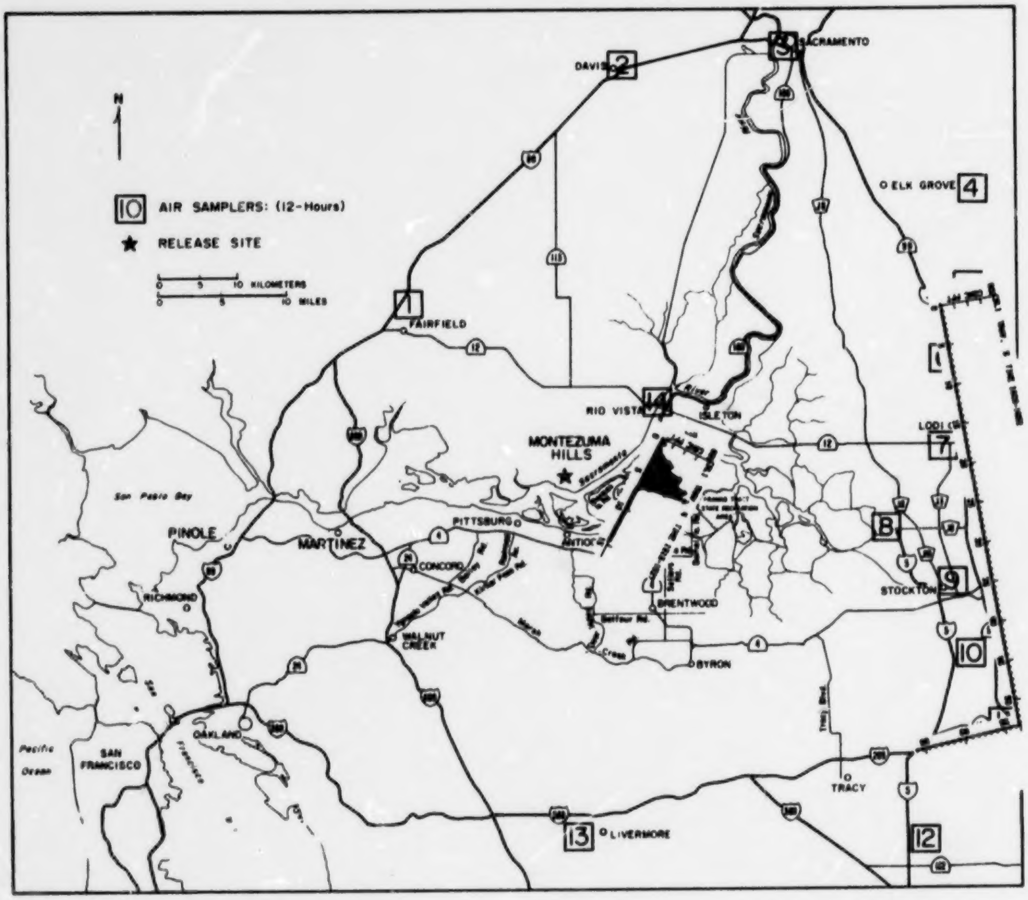

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS 2
3 SACRAMENTO
ELK GROVE 4
1 FAIRFIELD
RIO VISTA 14
ISLETON
MONTEZUMA HILLS
LODI
7
8
9
STOCKTON
10
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
BYRON
Pacific Ocean
SAN FRANCISCO
OAKLAND
TRACY
13 LIVERMORE
12

Figure 7.

TEST 1

3/31/76

Auto Traverses:

4 1515 - 1527 PDT, SF_6(max) = 756 ppt

5 1600 - 1652 PDT, SF_6(max) = 4 ppt

SF_6 released from the Montezuma Hills from 1200-1700 PDT.

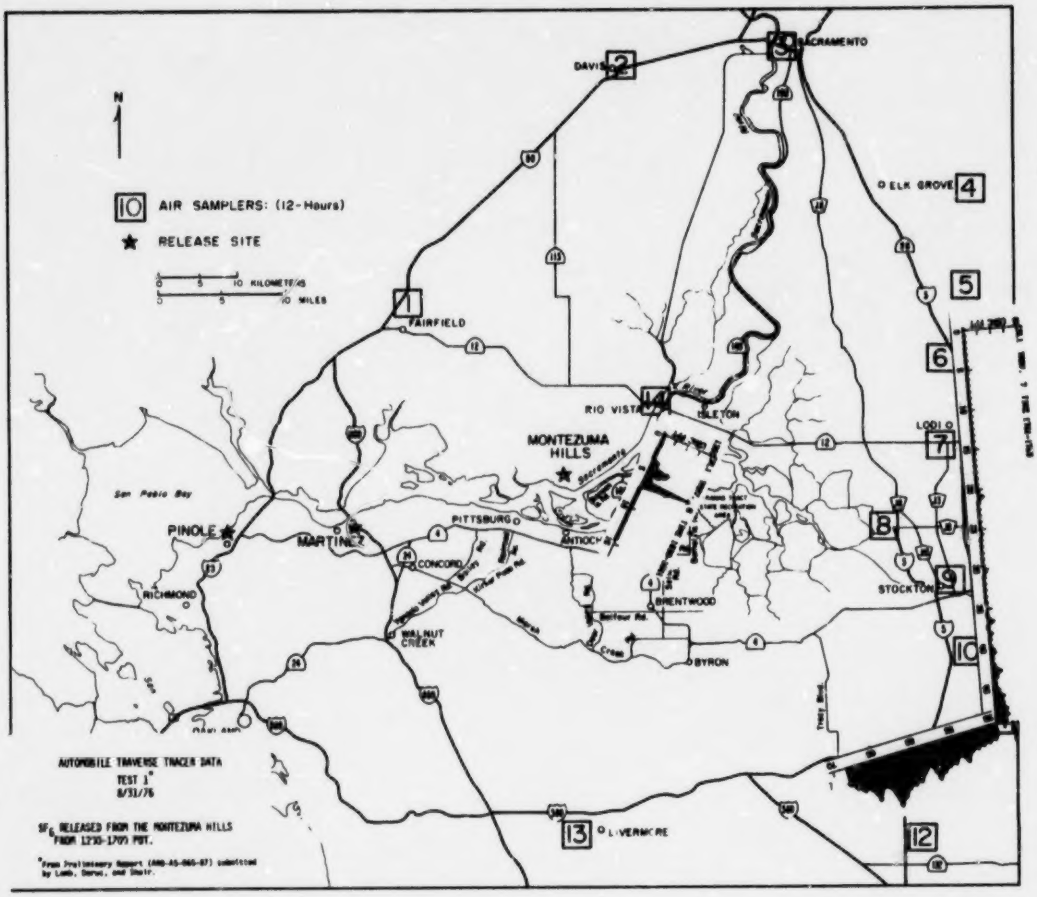

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
SACRAMENTO
DAVIS
ELK GROVE
FAIRFIELD
RIO VISTA
ISLETON
MONTEZUMA HILLS
LODI
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
BRENTWOOD
WALNUT CREEK
STOCKTON
BYRON
LIVERMORE
1
2
3
4
5
6
7
8
9
10
12
13
14
AUTOMOBILE TRAVERSE TRACER DATA
TEST 1*
8/31/76
SF6 RELEASED FROM THE MONTEZUMA HILLS FROM 1200-1700 PDT.
*From Preliminary Report (ARB-45-065-87) submitted by Lamb, Dorsi, and Shair.

Figure 8.

TEST 1

8/31/76

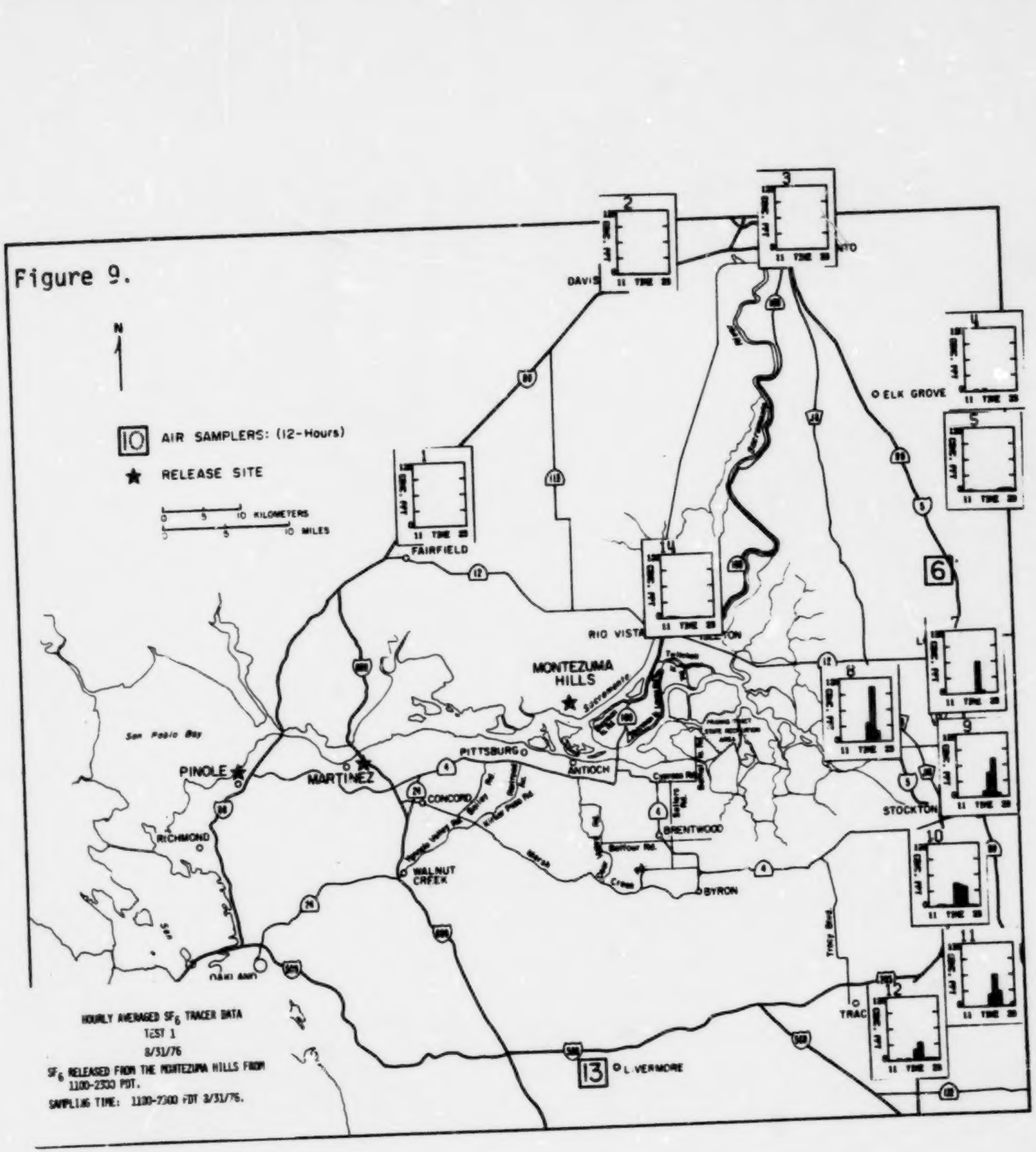
Auto Traverses:

6 1630 - 1641 PDT, SF_6(max) = 1223 ppt

7 1701 - 1753 PDT, SF_6(max) = 64 ppt

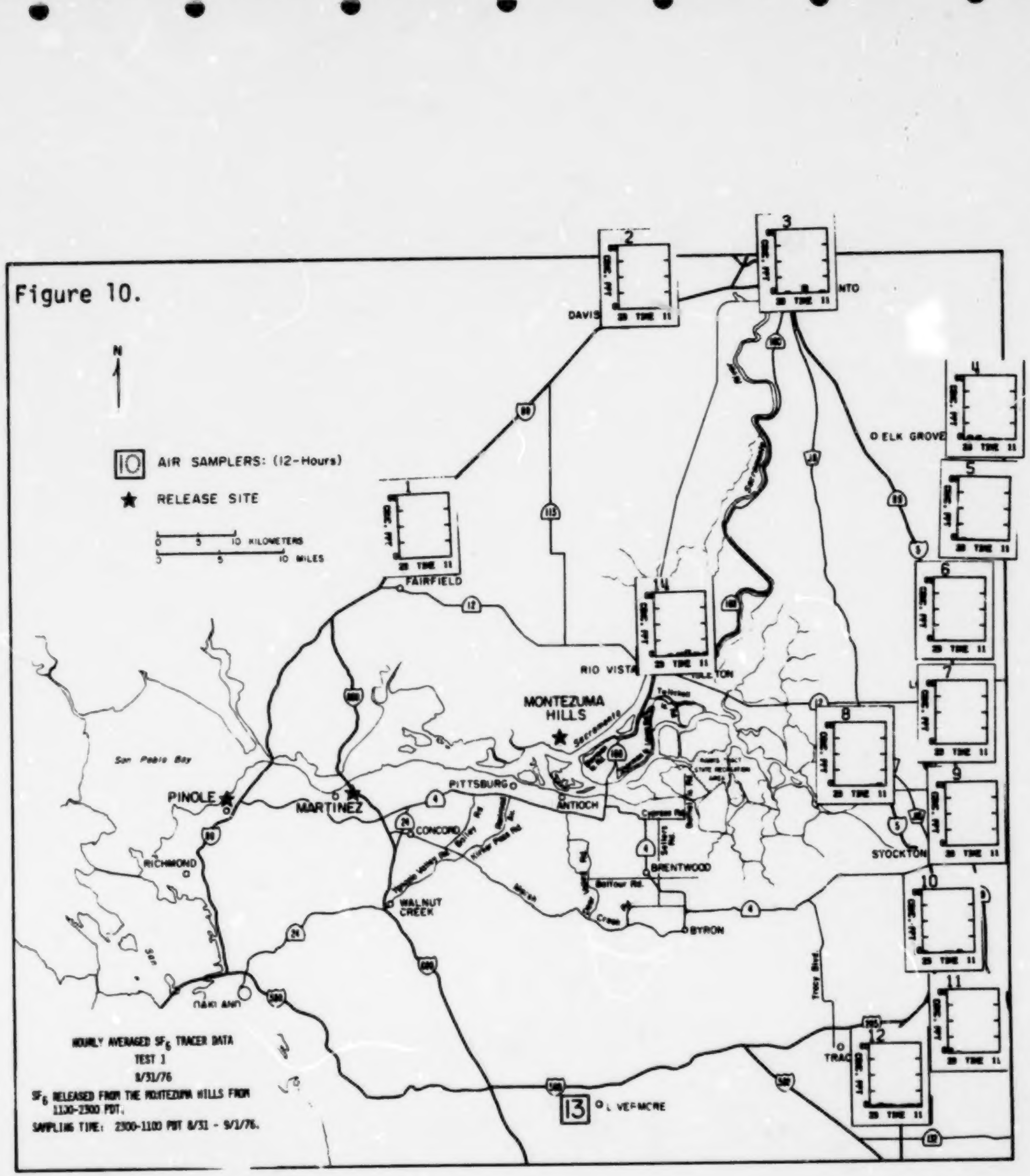
SF_6 released from the Montezuma Hills from 1200-1700 PDT.

Figure 9.


N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
1
2
3
4
5
6
7
8
9
10
11
12
13
14
CONC. PPT
11 TIME 23
DAVIS
ELK GROVE
FAIRFIELD
RIO VISTA
MONTEZUMA HILLS
Sacramento
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
BYRON
STOCKTON
TRAC
L.VERMORE
Tracy Blvd
Balfour Rd.
Marsh Creek
San
12
4
24
80
113
5
99
680
580

HOURLY AVERAGED SF_6 TRACER DATA
TEST 1
8/31/76
SF_6 RELEASED FROM THE MONTEZUMA HILLS FROM 1100-2300 PDT.
SAMPLING TIME: 1100-2300 PDT 8/31/76.

Figure 10.



N
AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
CONC. PPT
23 TIME 11
1
2
3
4
5
6
7
8
9
10
11
12
13
14
DAVIS
NTO
ELK GROVE
FAIRFIELD
RIO VISTA
MONTEZUMA HILLS
Sacramento
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
WALNUT CREEK
RICHMOND
BRENTWOOD
BYRON
STOCKTON
TRAC
Tracy Blvd
L VERMORE
OAKLAND
San
Balfour Rd.
Cypress Rd.
80
12
113
160
99
5
4
24
680
580

HOURLY AVERAGED SF_6 TRACER DATA
TEST 1
8/31/76

SF_6 RELEASED FROM THE MONTEZUMA HILLS FROM 1130-2300 PDT.

SAMPLING TIME: 2300-1100 PDT 8/31 - 9/1/76.

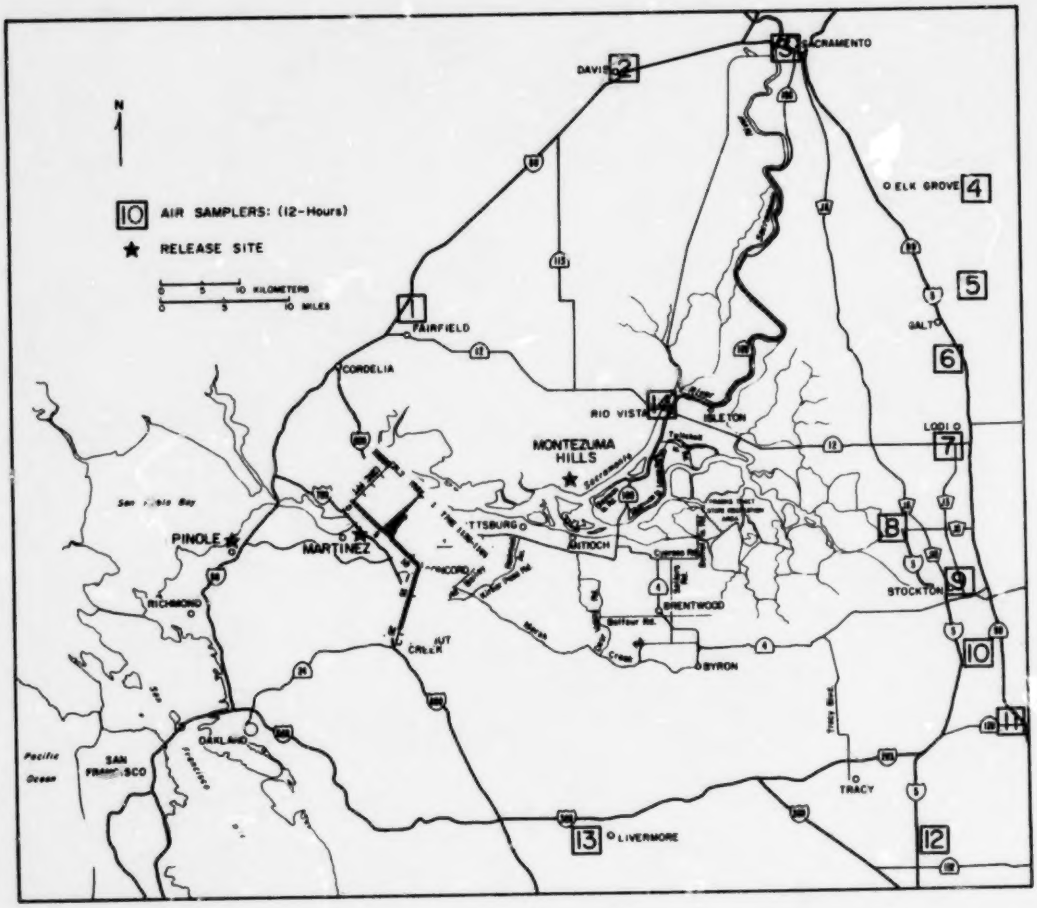

N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
SACRAMENTO
3
DAVIS
2
ELK GROVE
4
5
GALT
6
1
FAIRFIELD
CORDELIA
RIO VISTA
14
ISLETON
LODI
7
MONTEZUMA HILLS
Sacramento
River
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
8
STOCKTON
9
RICHMOND
BRENTWOOD
Balfour Rd.
Cypress Rd.
BYRON
WALNUT CREEK
10
11
Pacific Ocean
SAN FRANCISCO
OAKLAND
San Francisco
Tracy Blvd.
TRACY
13
LIVERMORE
12

Figure 11.

TEST 2

9/2/76

Auto Traverse:

1 1130 - 1144 PDT, SF_6(max) = 30,000 ppt

SF_6 released from Martinez from 1100-1600 PDT.

$CBrF_3$ released from the Montezuma Hills from 1300-1500 PDT.

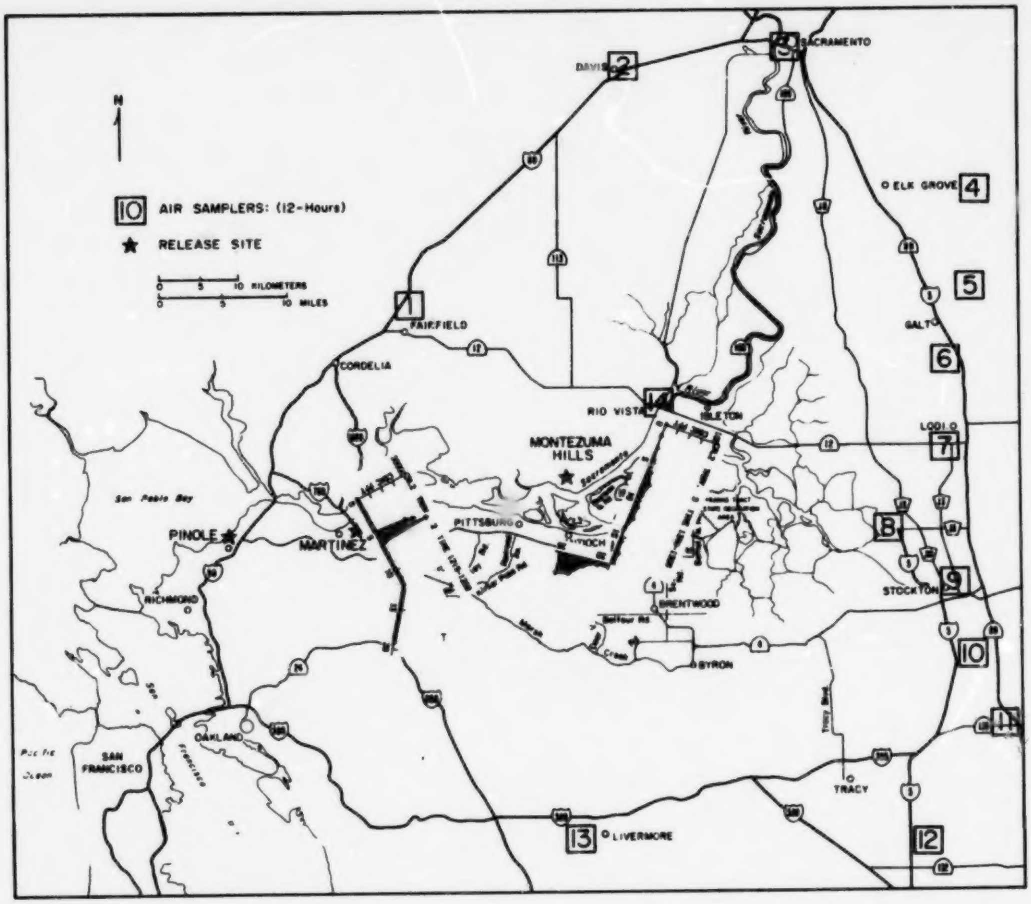

N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
SACRAMENTO
DAVIS
2
ELK GROVE
4
5
GALT
6
1
FAIRFIELD
CORDELIA
RIO VISTA
14
ISLETON
MONTEZUMA HILLS
LODI
7
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
8
STOCKTON
9
RICHMOND
BRENTWOOD
Balfour Rd
BYRON
10
11
Pacific Ocean
SAN FRANCISCO
OAKLAND
TRACY
13
LIVERMORE
12

Figure 12.

TEST 2

9/2/76

Auto Traverses:

2 1215 - 1228 PDT, SF$_6$(max) = 30,000 ppt

3 1240 - 1328 PDT, SF$_6$(max) - 41 ppt

SF$_6$ released from Martinez from 1100-1600 PDT.

CBrF$_3$ released from the Montezuma Hills from 1300-1500 PDT.

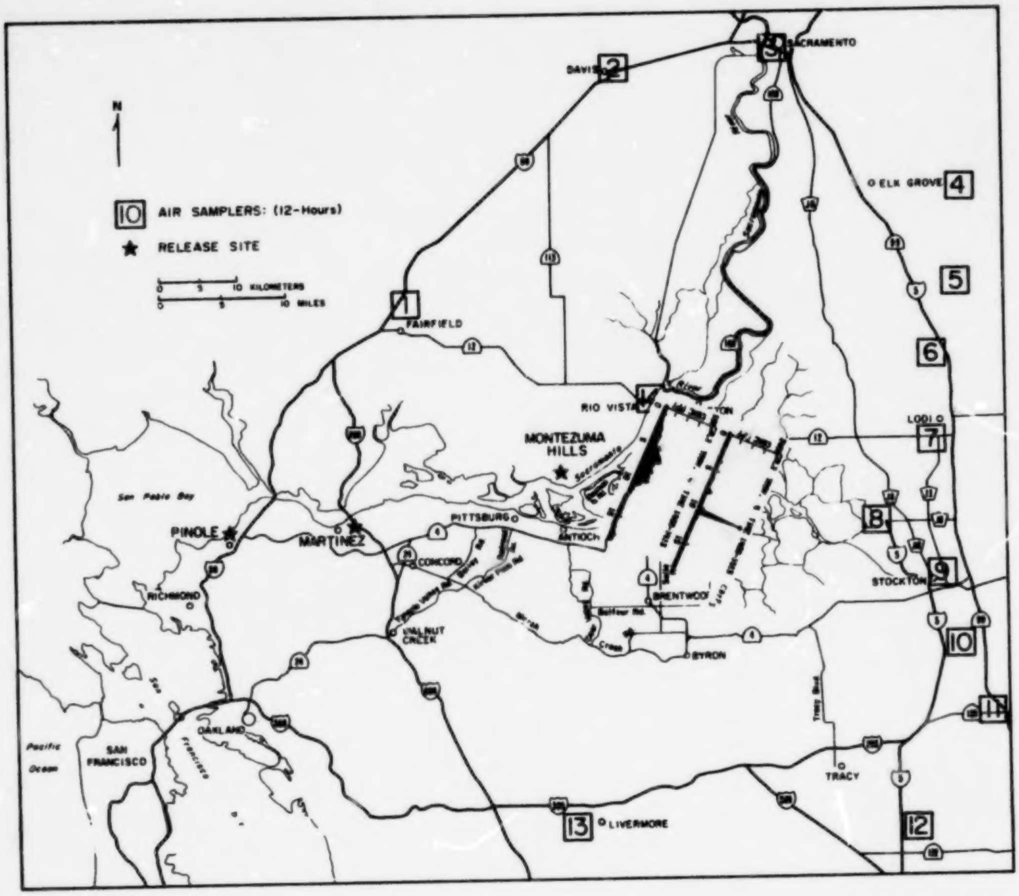

N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS 2
3 SACRAMENTO
ELK GROVE 4
5
6
LODI 7
8
STOCKTON 9
10
11
12
13 LIVERMORE
1 FAIRFIELD
14 RIO VISTA
MONTEZUMA HILLS
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
BYRON
TRACY
OAKLAND
SAN FRANCISCO
Pacific Ocean
Sacramento River

Figure 13.

TEST 2

9/2/76

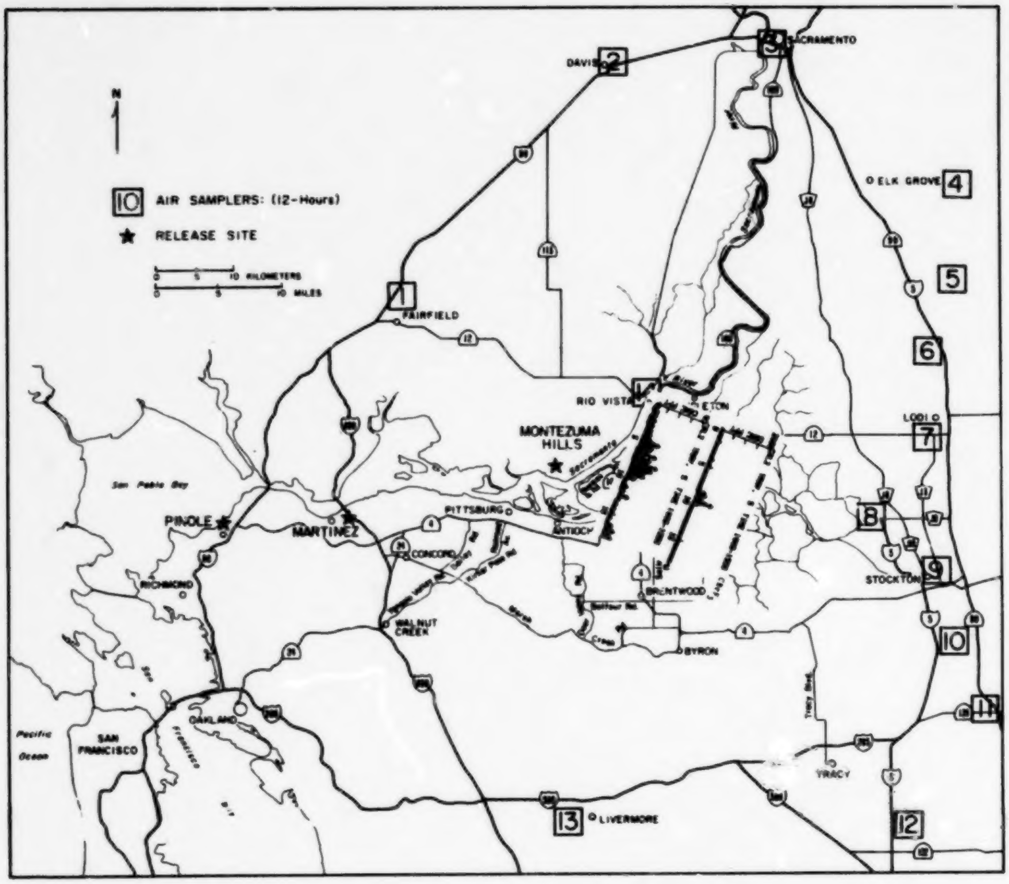
Auto Traverse:

4 1400-1415 PDT, SF_6(max) = 33 ppt.

1400-1415 PDT, $CBrF_3$(max) = 2168 ppt.

SF_6 released from Martinez from 1100-1600 PDT.

$CBrF_3$ released from the Montezuma Hills from 1300-1500 PDT.


N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
SACRAMENTO
DAVIS
ELK GROVE
FAIRFIELD
RIO VISTA
MONTEZUMA HILLS
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
BYRON
LODI
STOCKTON
Pacific Ocean
SAN FRANCISCO
OAKLAND
TRACY
LIVERMORE
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12
13

Figure 14. TEST 2

9/2/76

Auto Traverse:

5 1445-1503 PDT, SF_6(max) = 19 ppt.

1445-1503 PDT, $CBrF_3$(max) = 840 ppt.

SF_6 released from Martinez from 1100-1600 PDT.

$CBrF_3$ released from the Montezuma Hills from 1300-1500 PDT.

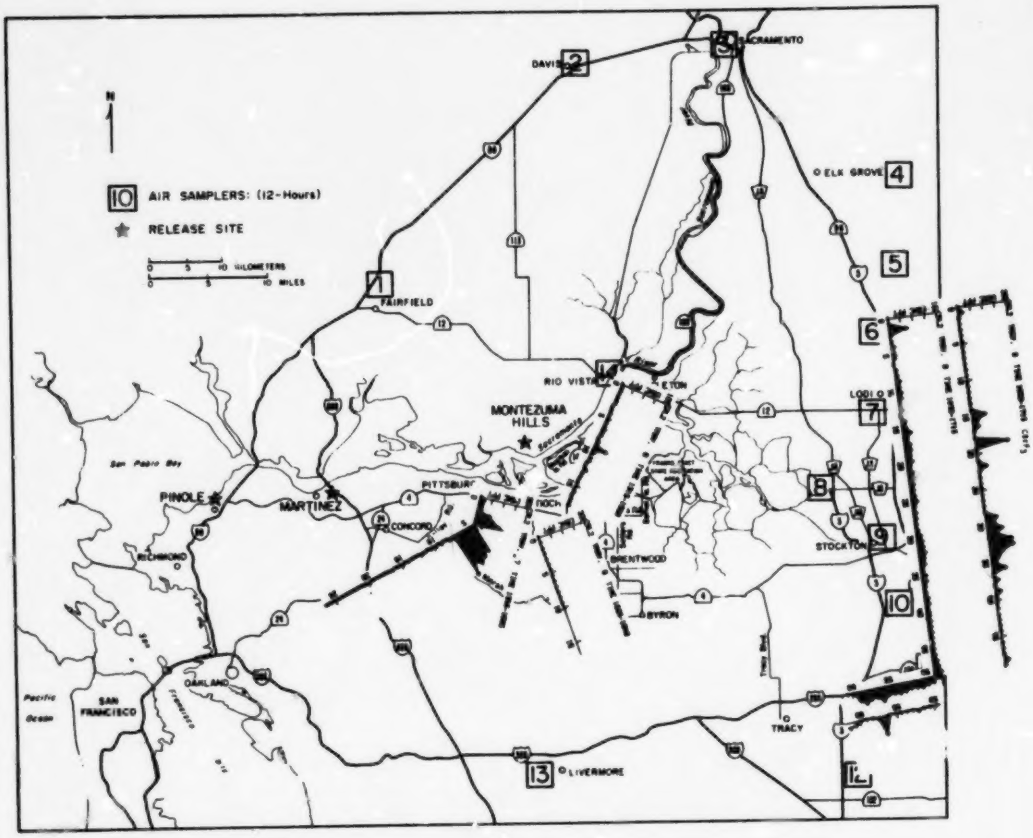

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
SACRAMENTO
DAVIS
2
3
ELK GROVE
4
5
1
FAIRFIELD
6
RIO VISTA
ETON
MONTEZUMA HILLS
LODI
7
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
CONCORD
8
9
STOCKTON
BRENTWOOD
RICHMOND
10
BYRON
OAKLAND
Pacific Ocean
SAN FRANCISCO
TRACY
13
LIVERMORE
12
$CBrF_3$

Figure 15.

TEST 2

9/2/76

Auto Traverses:

6 1515-1528 PDT, SF_6(max) = 28 ppt
7 1545-1635 PDT, SF_6(max) = 304 ppt.
8 1625-1640 PDT, SF_6(max) = 3 ppt.
9 1630-1715 PDT, SF_6(max) = 29 ppt.
1630-1715 PDT, $CBrF_3$(max) = 200 ppt.

SF_6 released from Martinez from 1100-1600 PDT.
$CBrF_3$ released from the Montezuma Hills from 1300-1500 PDT.

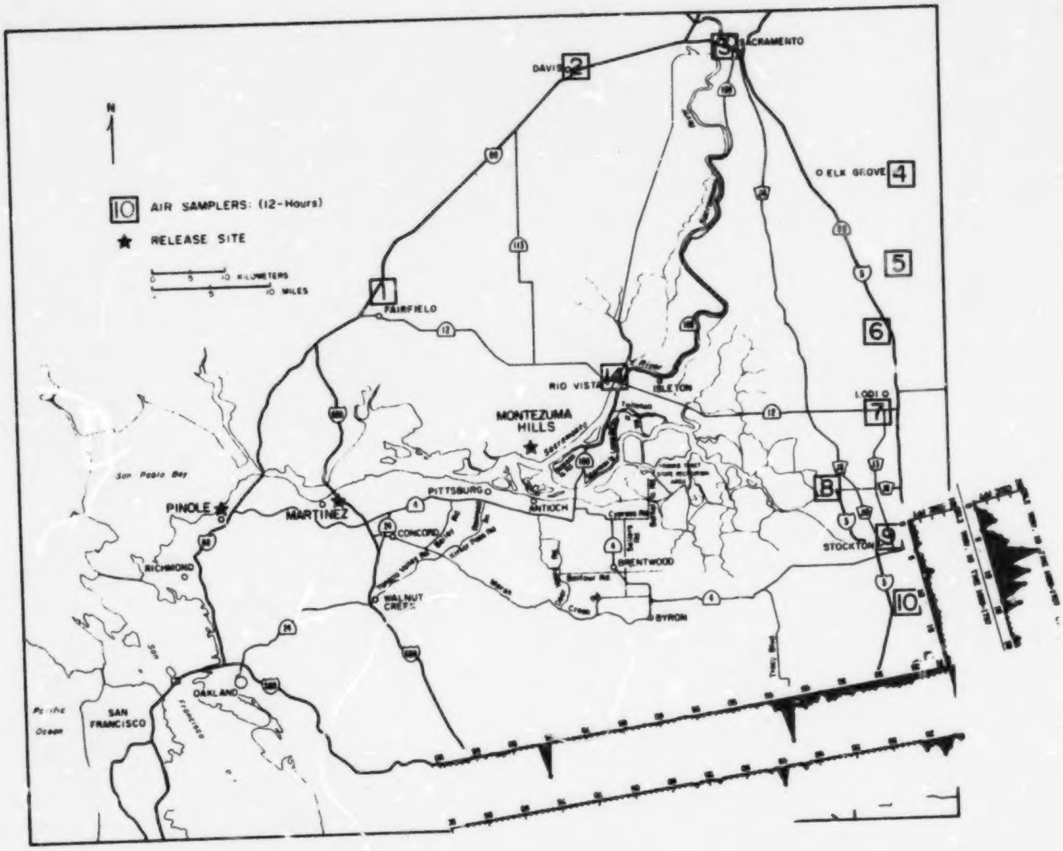

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS 2
3 SACRAMENTO
ELK GROVE 4
5
6
1 FAIRFIELD
RIO VISTA 14
ISLETON
LODI 7
MONTEZUMA HILLS
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
8
9
STOCKTON
BRENTWOOD
RICHMOND
WALNUT CREEK
BYRON
10
OAKLAND
SAN FRANCISCO
Pacific Ocean

Figure 16.

TEST 2
9/2/70

Auto Traverse:

10 1630-1737 PDT, SF_6(max) = 91 ppt.
1630-1737 PDT, $CBrF_3$(max) = 300 ppt.

SF_6 released from Martinez from 1100-1600 PDT.

$CBrF_3$ released from the Montezuma Hills from 1300-1500 PDT.

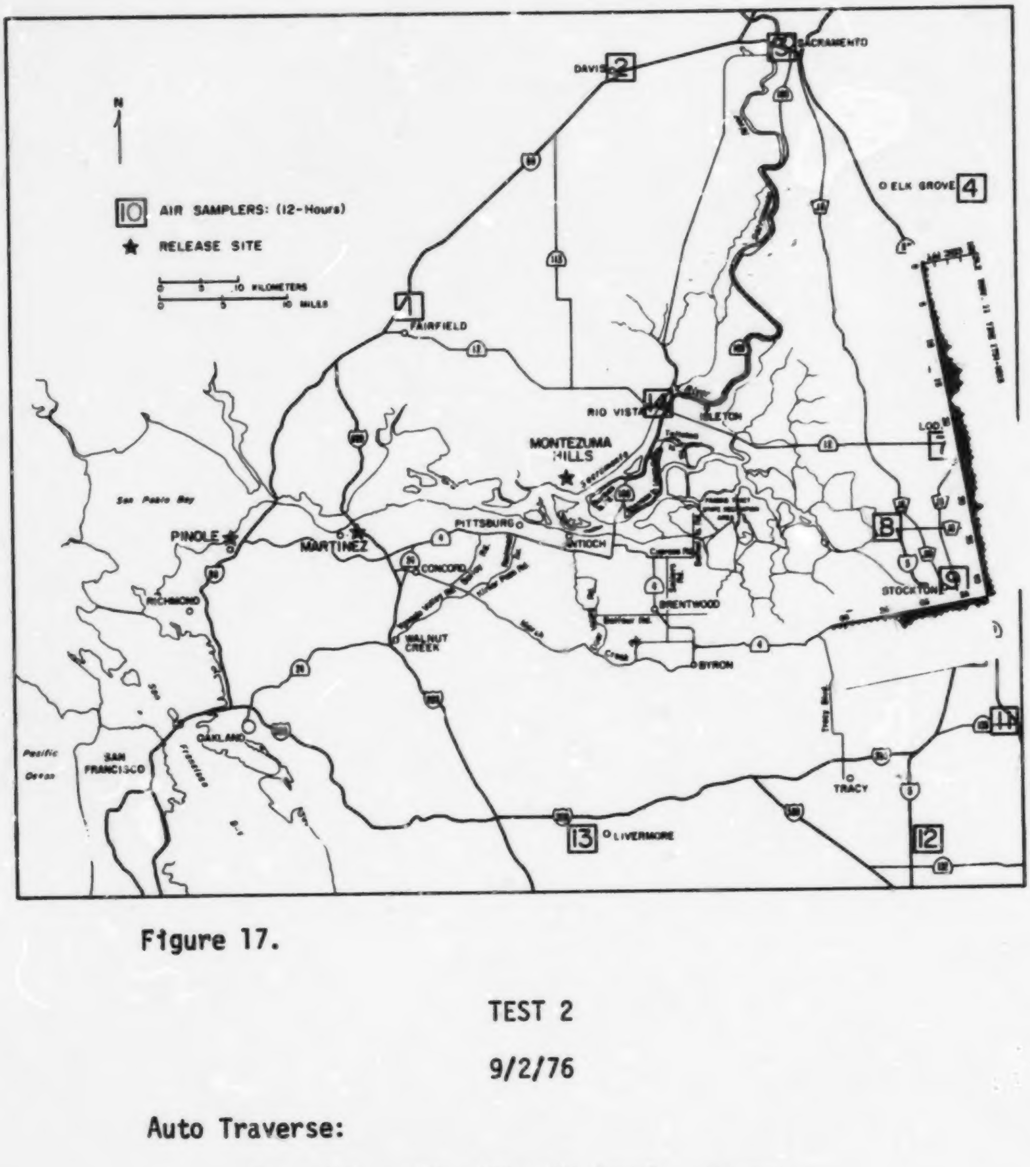

N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS 2
3 SACRAMENTO
O ELK GROVE 4
1 FAIRFIELD
RIO VISTA 14
ISLETON
MONTEZUMA HILLS
LODI 7
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
8
9
STOCKTON
RICHMOND
BRENTWOOD
WALNUT CREEK
BYRON
11
Pacific Ocean
SAN FRANCISCO
OAKLAND
TRACY
13 LIVERMORE
12

Figure 17.

TEST 2

9/2/76

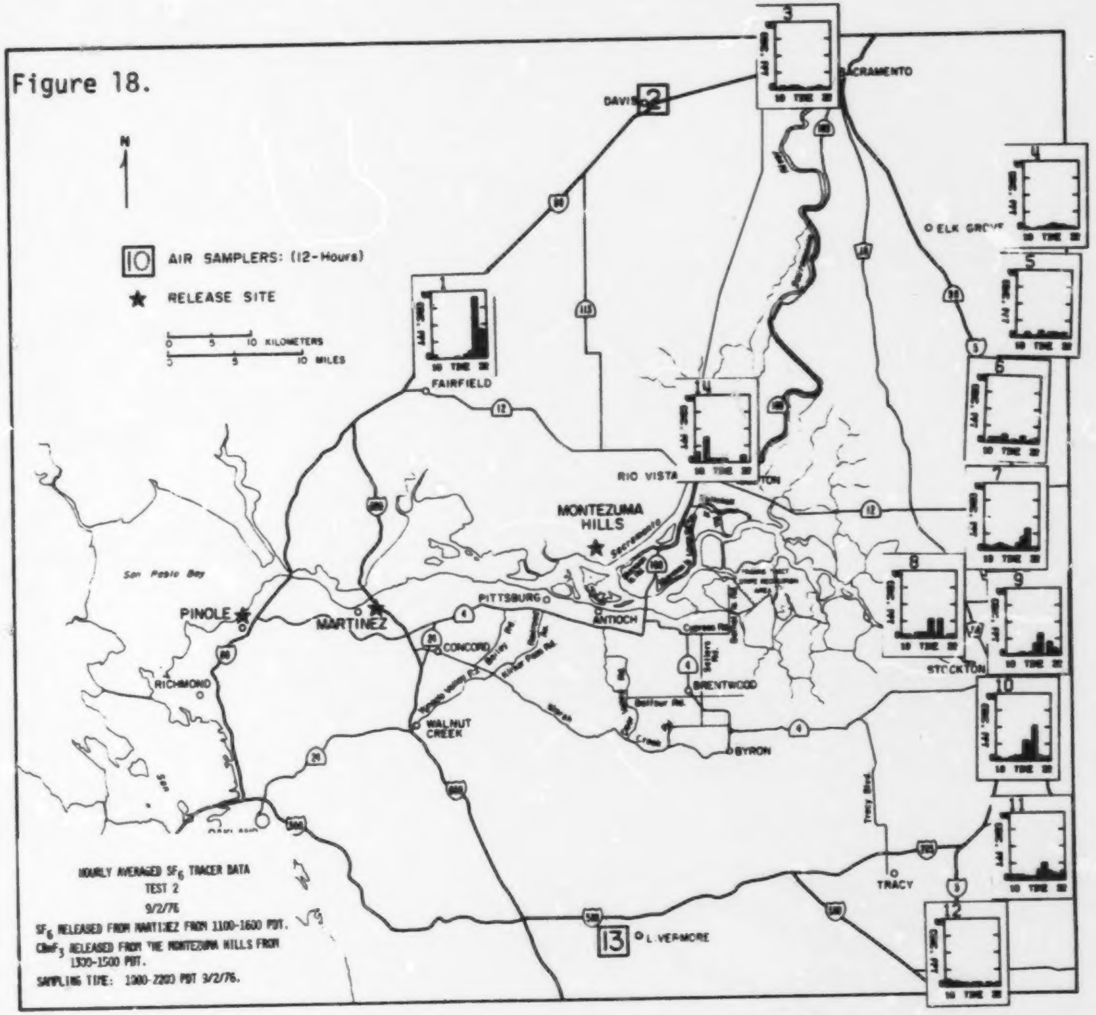
Auto Traverse:

11 1731 - 1815 PDT, SF_6(max) = 32 ppt

SF_6 released from Martinez from 1100-1600 PDT.

$CBrF_3$ released from the Montezuma Hills from 1300-1500 PDT.

Figure 18.


N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS
2
SACRAMENTO
ELK GROVE
FAIRFIELD
RIO VISTA
MONTEZUMA HILLS
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
BYRON
STOCKTON
TRACY
LIVERMORE
13
CONC. PPT
10 TIME 20
1
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9
10
11
12
14

HOURLY AVERAGED SF_6 TRACER DATA
TEST 2
9/2/76

SF_6 RELEASED FROM MARTINEZ FROM 1100-1600 PDT.
$CBrF_3$ RELEASED FROM THE MONTEZUMA HILLS FROM 1300-1500 PDT.
SAMPLING TIME: 1000-2200 PDT 9/2/76.

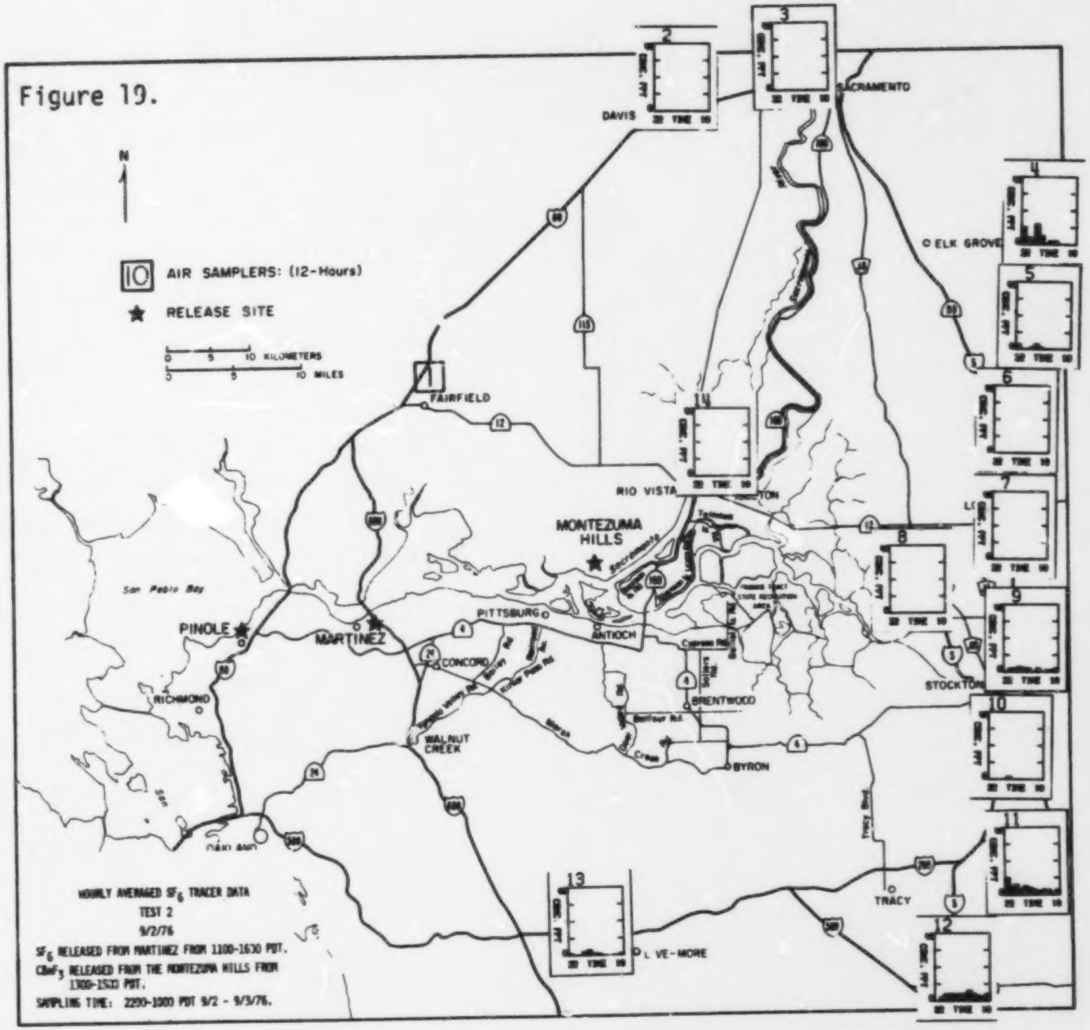

Figure 19.

HOURLY AVERAGED SF_6 TRACER DATA
TEST 2
9/2/76
SF_6 RELEASED FROM MARTINEZ FROM 1100-1630 PDT.
$CBrF_3$ RELEASED FROM THE MONTEZUMA HILLS FROM 1300-1530 PDT.
SAMPLING TIME: 2200-1000 PDT 9/2 - 9/3/76.

N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS
SACRAMENTO
ELK GROVE
FAIRFIELD
RIO VISTA
MONTEZUMA HILLS
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
BRENTWOOD
WALNUT CREEK
BYRON
STOCKTON
TRACY
RICHMOND
OAKLAND
L VE-MORE
San Pablo Bay
CONC. PPT
22 TIME 10
1
2
3
4
5
6
7
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11
12
13
14

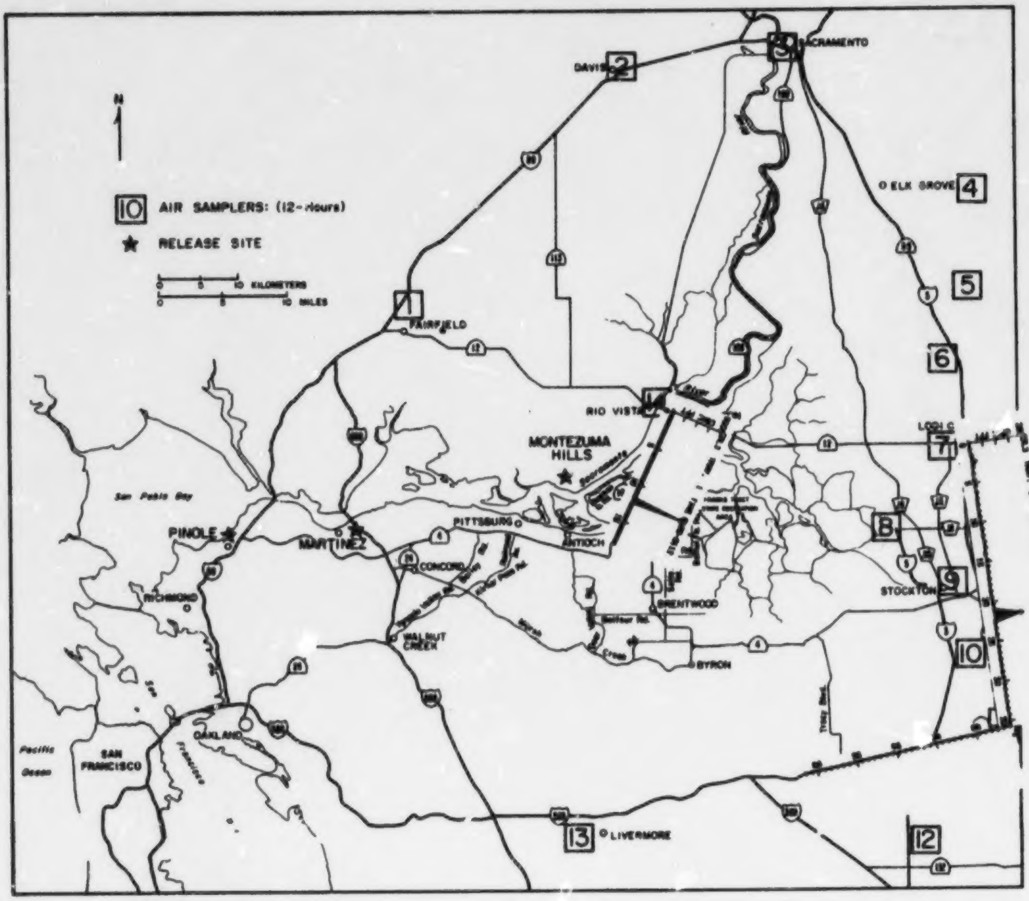

N
10 AIR SAMPLERS: (12-hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
1
2
3
4
5
6
7
8
9
10
12
13
DAVIS
SACRAMENTO
ELK GROVE
FAIRFIELD
RIO VISTA
MONTEZUMA HILLS
LODI
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
BYRON
STOCKTON
OAKLAND
SAN FRANCISCO
Pacific Ocean
LIVERMORE

Figure 20.

TEST 3

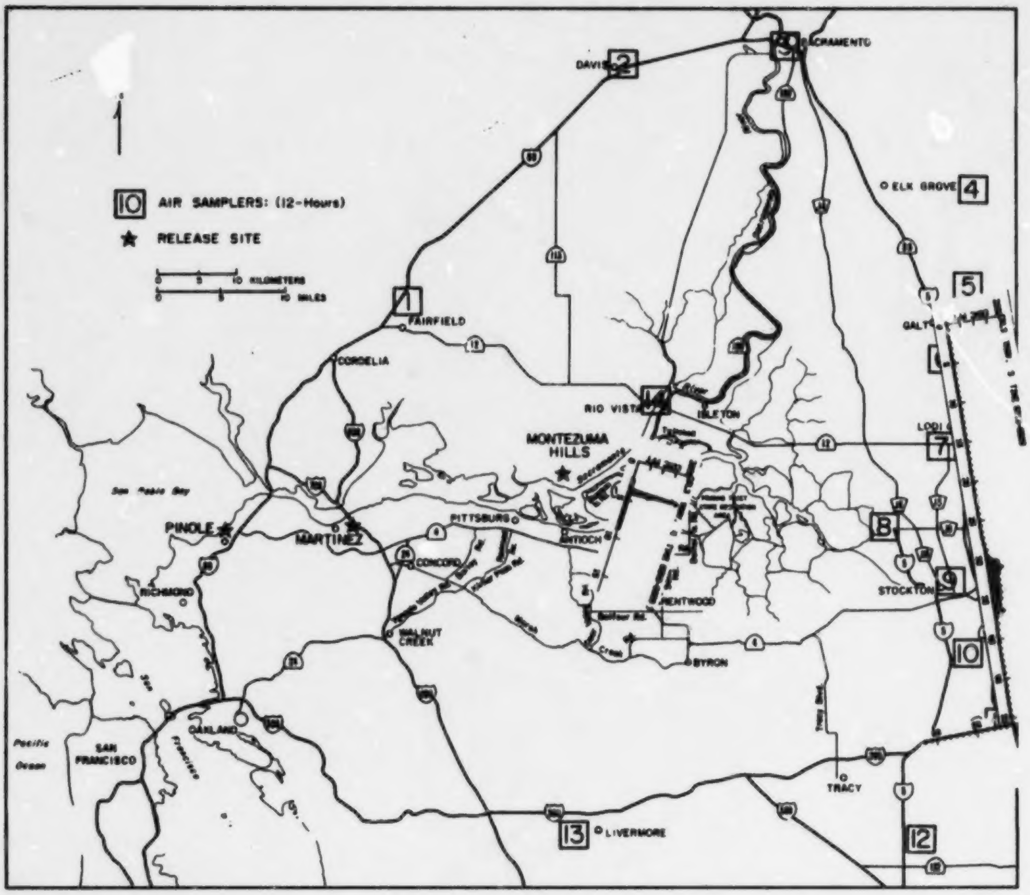
9/5/76

Auto Traverses:

1 0100 - 0112 PDT, SF_6(max) = 8146 ppt

2 0130 - 0210 PDT, SF_6(max) = 104 ppt

SF_6 released from the Montezuma Hills from 0000-0500 PDT.


10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
SACRAMENTO
DAVIS
ELK GROVE
GALT
LODI
STOCKTON
FAIRFIELD
CORDELIA
RIO VISTA
ISLETON
MONTEZUMA HILLS
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
BYRON
OAKLAND
SAN FRANCISCO
Pacific Ocean
San Pablo Bay
TRACY
LIVERMORE
1
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13
14

Figure 21.

TEST 3

9/5/76

Auto Traverses:

3 0213 - 0259 PDT, SF_6(max) = 537 ppt

4 0240 - 0300 PDT, SF_6(max) = 1856 ppt

SF_6 released from the Montezuma Hills from 0000-0500 PDT.

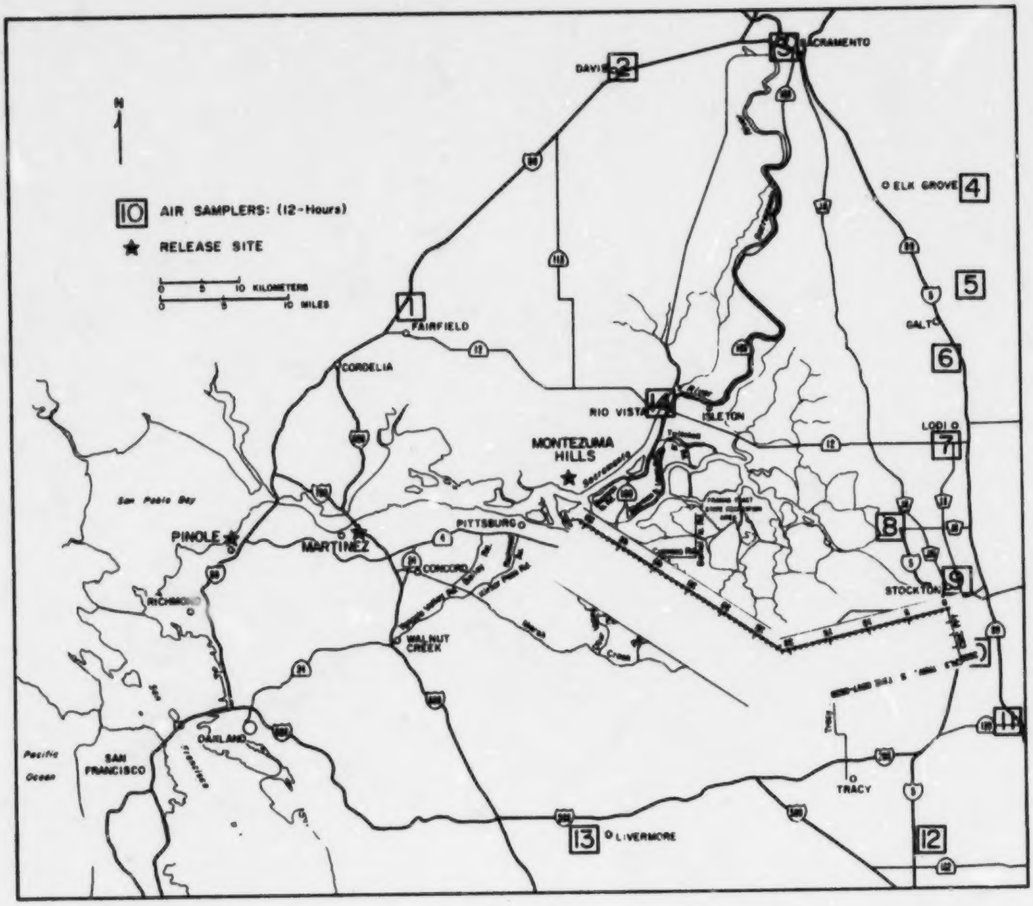
N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS
2
3
SACRAMENTO
ELK GROVE
4
5
GALT
6
LODI
7
8
STOCKTON
9
10
11
TRACY
12
13
LIVERMORE
1
FAIRFIELD
CORDELIA
RIO VISTA
14
ISLETON
MONTEZUMA HILLS
Sacramento
PITTSBURG
MARTINEZ
PINOLE
San Pablo Bay
CONCORD
WALNUT CREEK
RICHMOND
OAKLAND
SAN FRANCISCO
Pacific Ocean

Figure 22.

TEST 3

9/5/76

Auto Traverse:

5 0247 - 0320 PDT, SF_6(max) = 3 ppt

SF_6 released from the Montezuma Hills from 0000-0500 PDT.

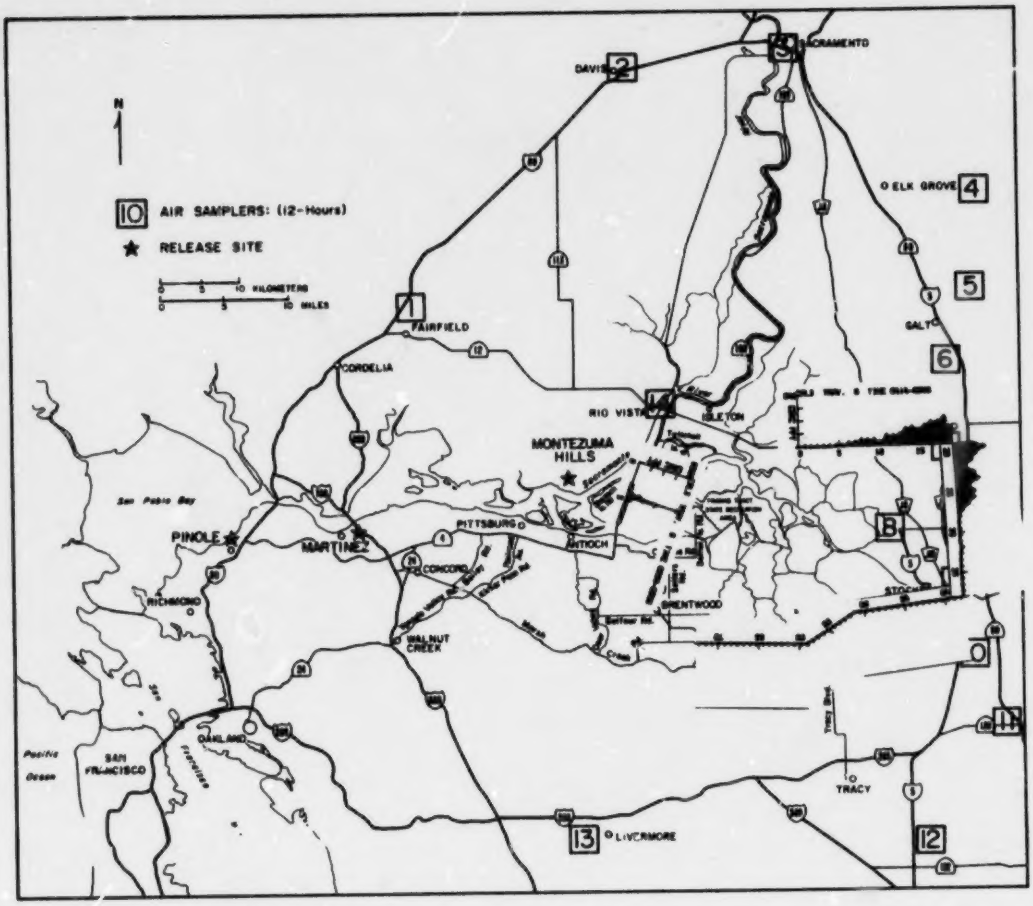
N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS
2
3
SACRAMENTO
ELK GROVE
4
5
GALT
6
1
FAIRFIELD
CORDELIA
RIO VISTA
14
ISLETON
MONTEZUMA HILLS
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
Balfour Rd.
8
STOCKTON
10
11
OAKLAND
SAN FRANCISCO
Pacific Ocean
TRACY
12
13
LIVERMORE

Figure 23.

TEST 3

9/5/76

Auto Traverses:

6 0259 - 0306 PDT, SF_6(max) = 8660 ppt

8 0414 - 0545 PDT, SF_6(max) = 370 ppt

SF_6 released from the Montezuma Hills from 0000-0500 PDT.

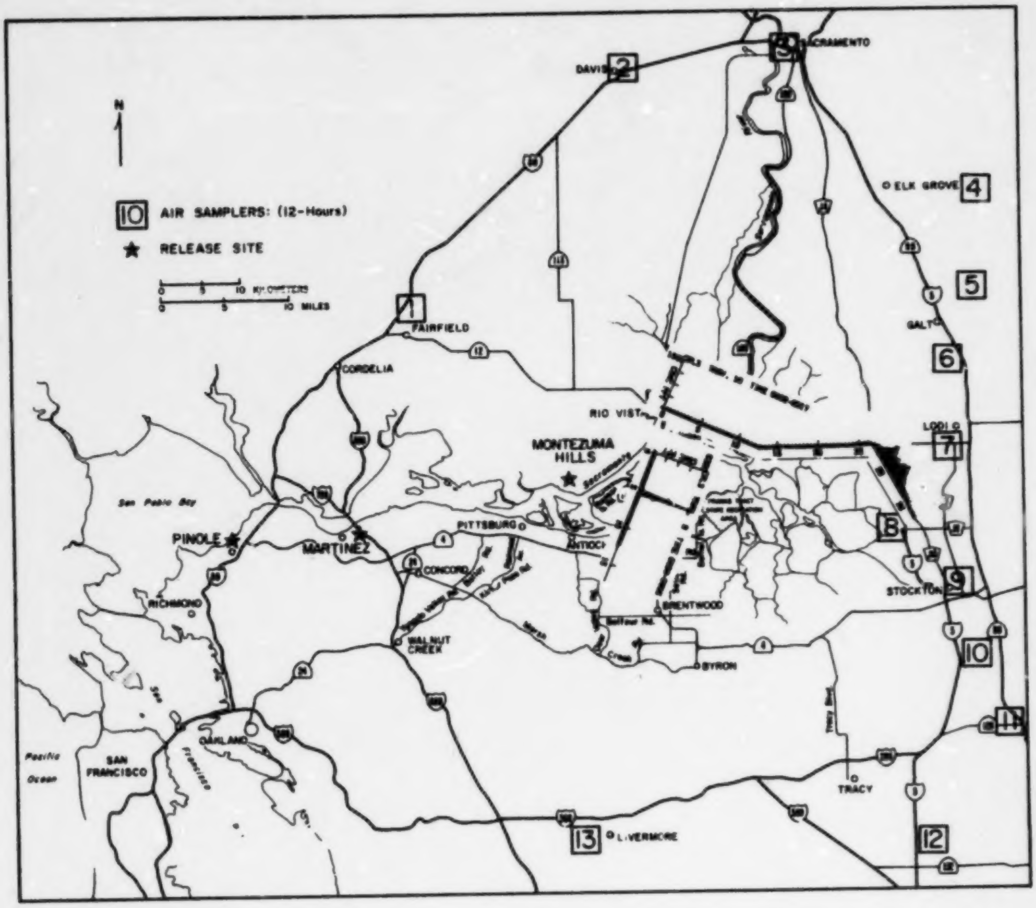
N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS
2
3
SACRAMENTO
ELK GROVE
4
5
GALT
6
LODI
7
8
STOCKTON
9
10
11
12
TRACY
13
LIVERMORE
1
FAIRFIELD
CORDELIA
RIO VISTA
MONTEZUMA HILLS
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
BYRON
OAKLAND
SAN FRANCISCO
Pacific Ocean

Figure 24.

TEST 3

9/5/76

Auto Traverses:

9 0430 - 0445 PDT, SF_6(max) = 6178 ppt

10 0432 - 0517 PDT, SF_6(max) = 608 ppt

SF_6 released from the Montezuma Hills from 0000-0500 PDT.

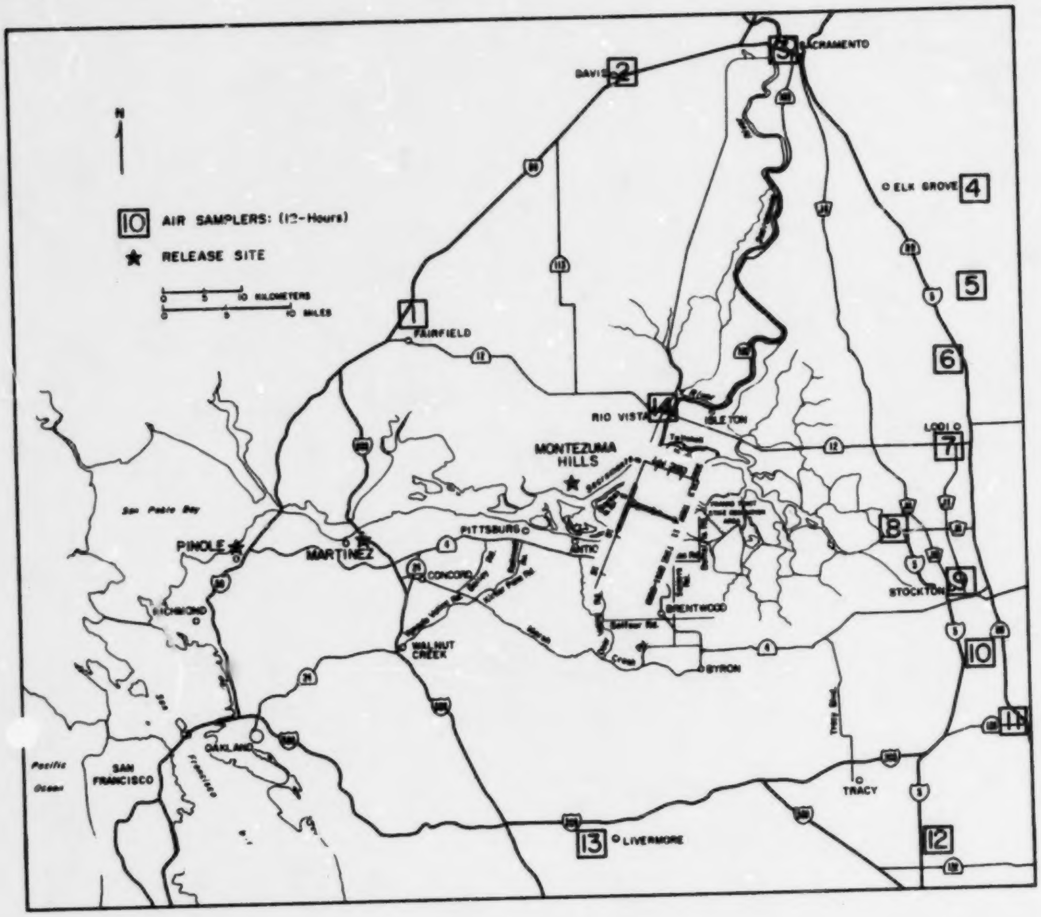
N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
SACRAMENTO
DAVIS
ELK GROVE
FAIRFIELD
RIO VISTA
ISLETON
MONTEZUMA HILLS
LODI
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
STOCKTON
RICHMOND
BRENTWOOD
WALNUT CREEK
BYRON
OAKLAND
SAN FRANCISCO
Pacific Ocean
TRACY
LIVERMORE
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Figure 25.

TEST 3

9/5/76

Auto Traverse:

11 0441 - 0450 PDT, SF_6(max) = 2852 ppt

SF_6 released from the Montezuma Hills from 0000-0500 PDT.

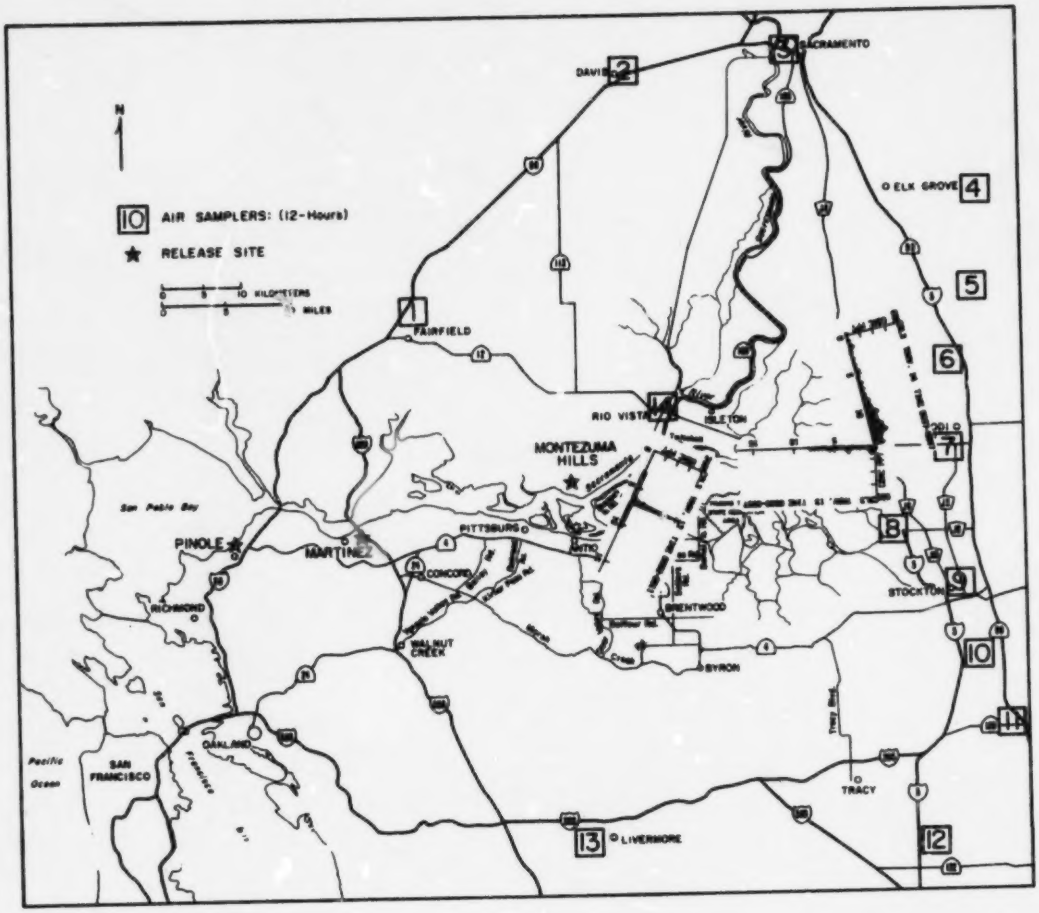

N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
1 FAIRFIELD
DAVIS 2
3 SACRAMENTO
ELK GROVE 4
5
6
7
8
9
10
11
12
13 LIVERMORE
14 RIO VISTA
ISLETON
MONTEZUMA HILLS
Sacramento
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
BYRON
STOCKTON
TRACY
Pacific Ocean
SAN FRANCISCO
OAKLAND
San Francisco Bay
12
4
24
80
113
680
580
205
5
99
120
160

Figure 26.

TEST 3

9/5/76

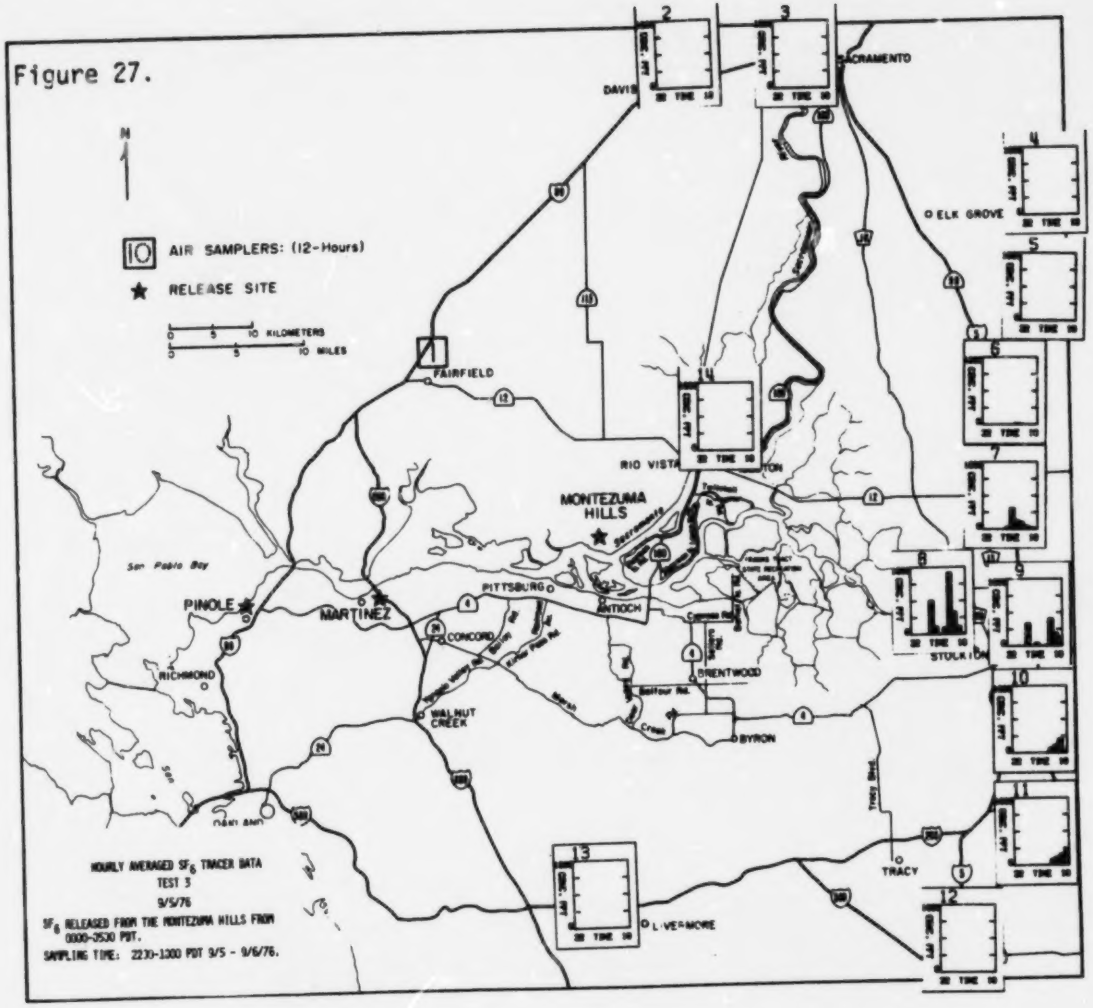
Auto Traverses:

12 0502 - 0511 PDT, SF_6(max) = 2261 ppt

14 0637 - 0647 PDT, SF_6(max) = 173 ppt

SF_6 released from the Montezuma Hills from 0000-0500 PDT.

Figure 27.

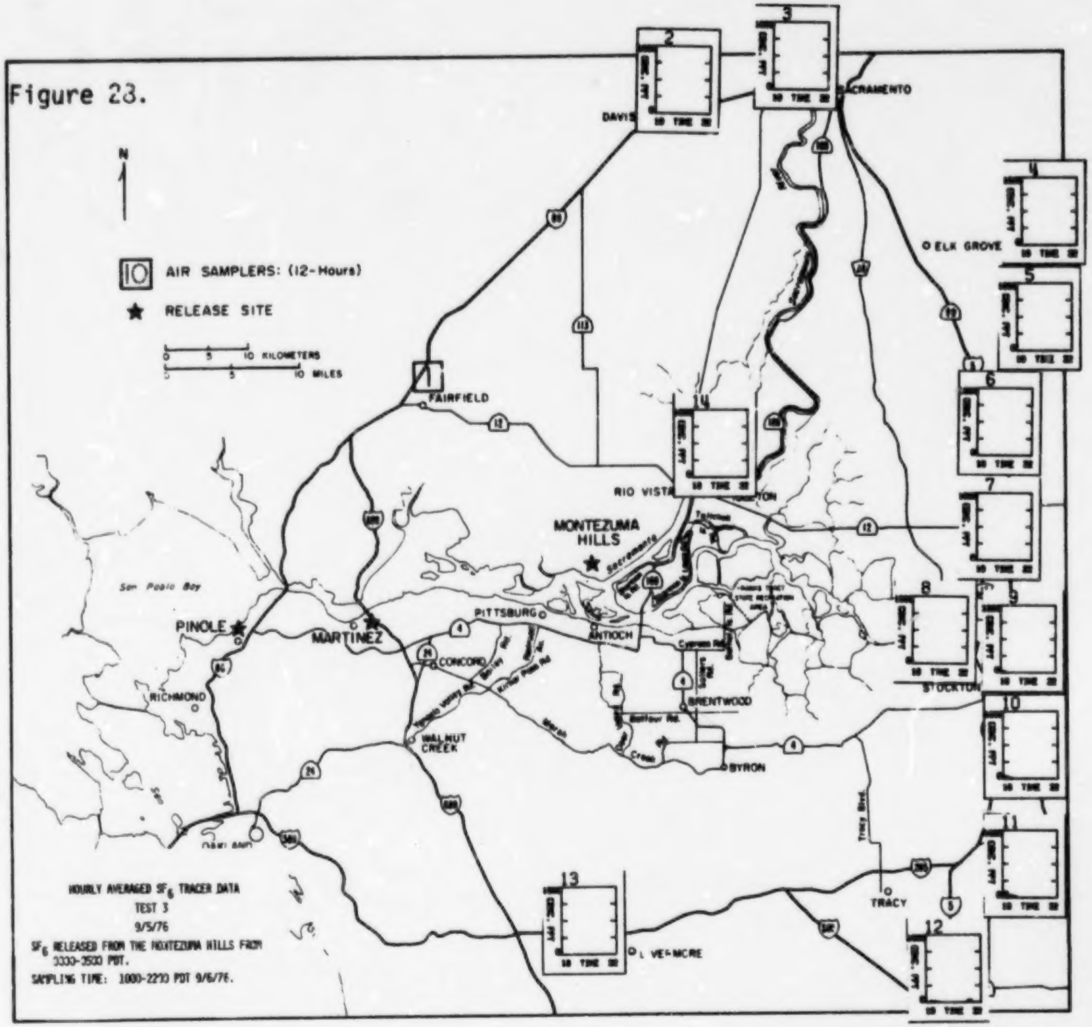

N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
1
2
3
4
5
6
7
8
9
10
11
12
13
14
CONC. PPT
20 TIME 10
DAVIS
SACRAMENTO
ELK GROVE
FAIRFIELD
RIO VISTA
MONTEZUMA HILLS
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
BRENTWOOD
RICHMOND
WALNUT CREEK
BYRON
STOCKTON
TRACY
LIVERMORE
OAKLAND
Balfour Rd.
Tracy Blvd.
12
80
4
24
5
580
680
205
99
160
113
17

HOURLY AVERAGED SF_6 TRACER DATA
TEST 3
9/5/76

SF_6 RELEASED FROM THE MONTEZUMA HILLS FROM 0000-0530 PDT.

SAMPLING TIME: 2230-1300 PDT 9/5 - 9/6/76.

Figure 23.


N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
1
2
3
4
5
6
7
8
9
10
11
12
13
14
CONC. PPT
10 TIME 22
DAVIS
SACRAMENTO
ELK GROVE
FAIRFIELD
RIO VISTA
MONTEZUMA HILLS
Sacramento
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
BYRON
STOCKTON
TRACY
Tracy Blvd.
L VERMORE
Cypress Rd.
Balfour Rd.
Oakland
80
113
12
160
99
5
4
24
680
580
205

HOURLY AVERAGED SF$_6$ TRACER DATA
TEST 3
9/5/76

SF$_6$ RELEASED FROM THE MONTEZUMA HILLS FROM
0300-0500 PDT.

SAMPLING TIME: 1000-2230 PDT 9/6/76.

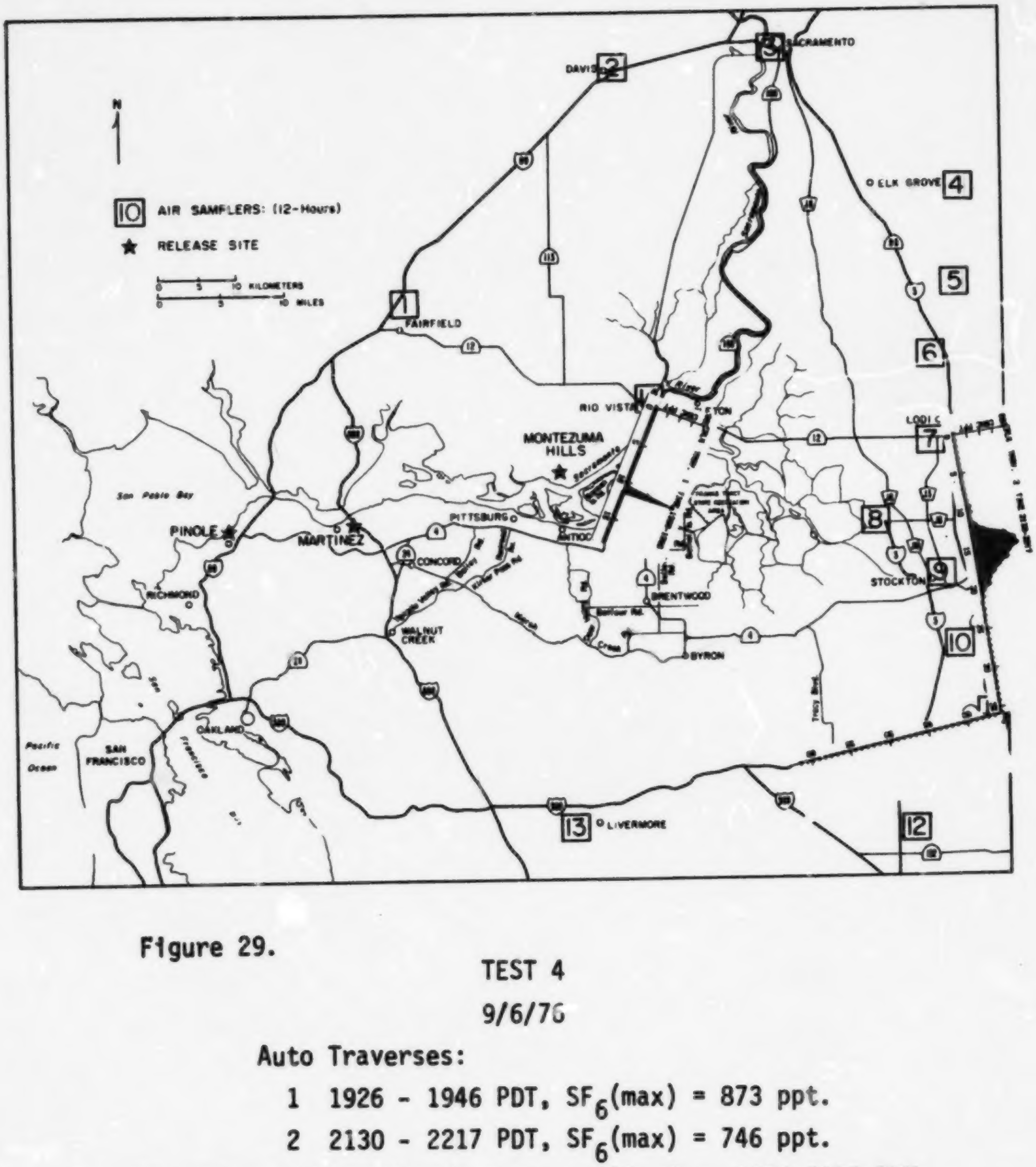

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
SACRAMENTO
3
DAVIS
2
ELK GROVE
4
5
6
1
FAIRFIELD
RIO VISTA
MONTEZUMA HILLS
Sacramento River
LODI
7
8
STOCKTON
9
10
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
Balfour Rd.
BYRON
Tracy Blvd.
Pacific Ocean
SAN FRANCISCO
OAKLAND
13
LIVERMORE
12

Figure 29.

TEST 4

9/6/76

Auto Traverses:

1 1926 - 1946 PDT, SF_6(max) = 873 ppt.

2 2130 - 2217 PDT, SF_6(max) = 746 ppt.

SF_6 released from the Montezuma Hills from 1800-2300 PDT.

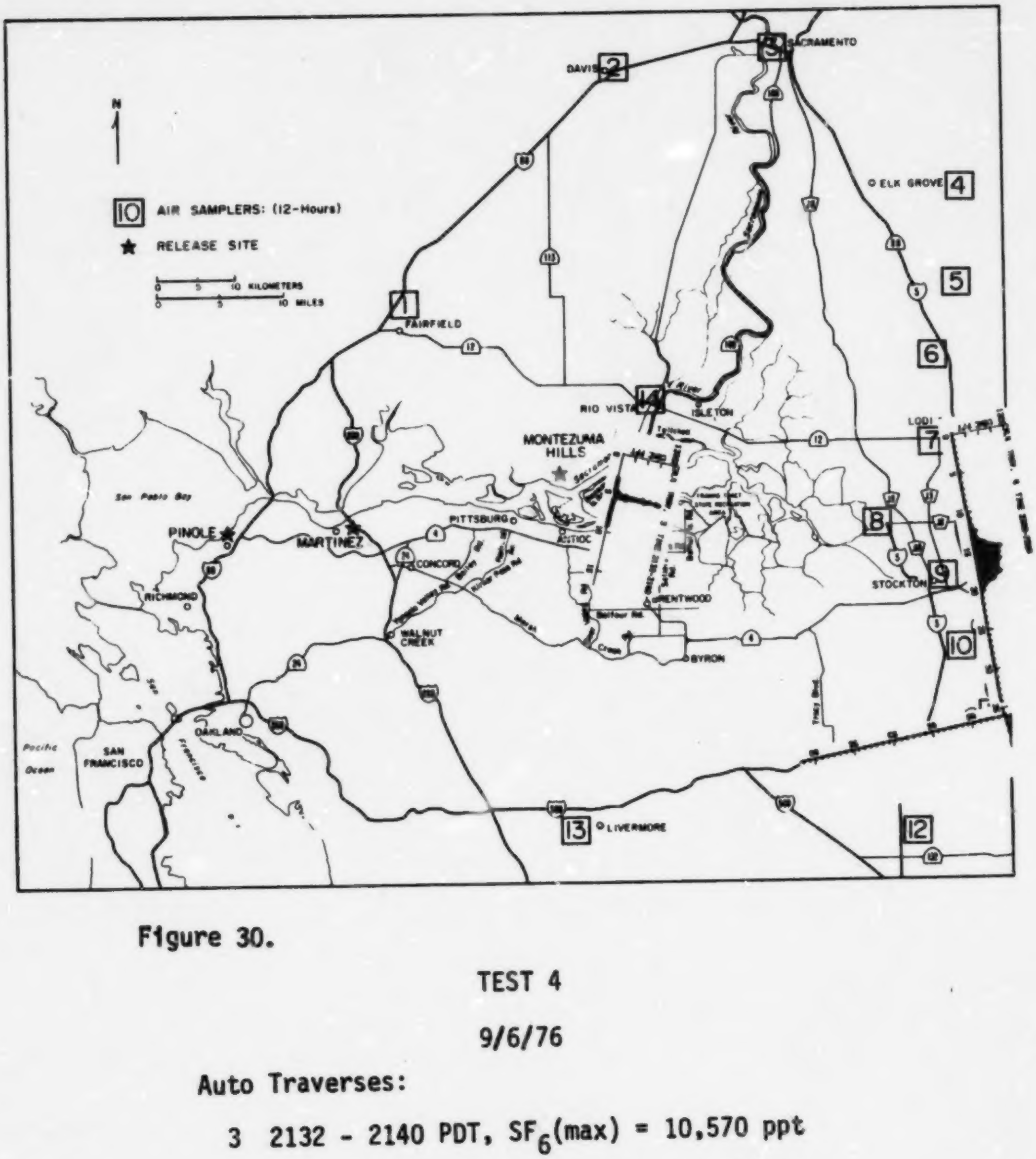

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
1
2
3
4
5
6
7
8
9
10
12
13
14
DAVIS
SACRAMENTO
ELK GROVE
FAIRFIELD
RIO VISTA
ISLETON
LODI
MONTEZUMA HILLS
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOC
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
Balfour Rd.
Creek
BYRON
Tracy Blvd
STOCKTON
Pacific Ocean
SAN FRANCISCO
OAKLAND
LIVERMORE

Figure 30.

TEST 4

9/6/76

Auto Traverses:

3 2132 - 2140 PDT, SF_6(max) = 10,570 ppt

4 2200 - 2246 PDT, SF_6(max) = 628 ppt

SF_6 released from the Montezuma Hills from 1800-2300 PDT.

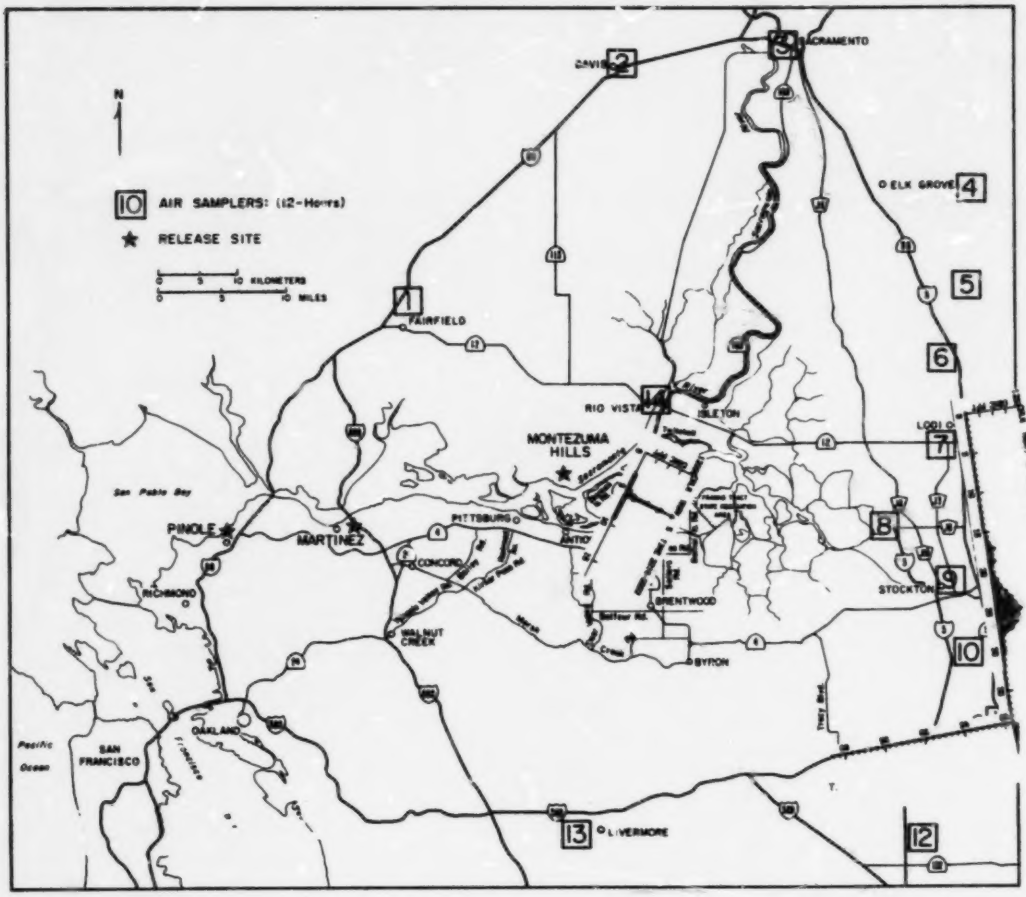

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS 2
SACRAMENTO 3
ELK GROVE 4
5
6
1 FAIRFIELD
RIO VISTA 14
ISLETON
MONTEZUMA HILLS
LODI 7
8
STOCKTON 9
10
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
BYRON
Pacific Ocean
SAN FRANCISCO
OAKLAND
13 LIVERMORE
12

Figure 31.

TEST 4

9/6/76

Auto Traverses:

5 2214 - 2222 PDT, SF_6(max) = 11,900 ppt

6 2232 - 2320 PDT, SF_6(max) = 553 ppt

SF_6 released from the Montezuma Hills from 1800-2300 PDT.

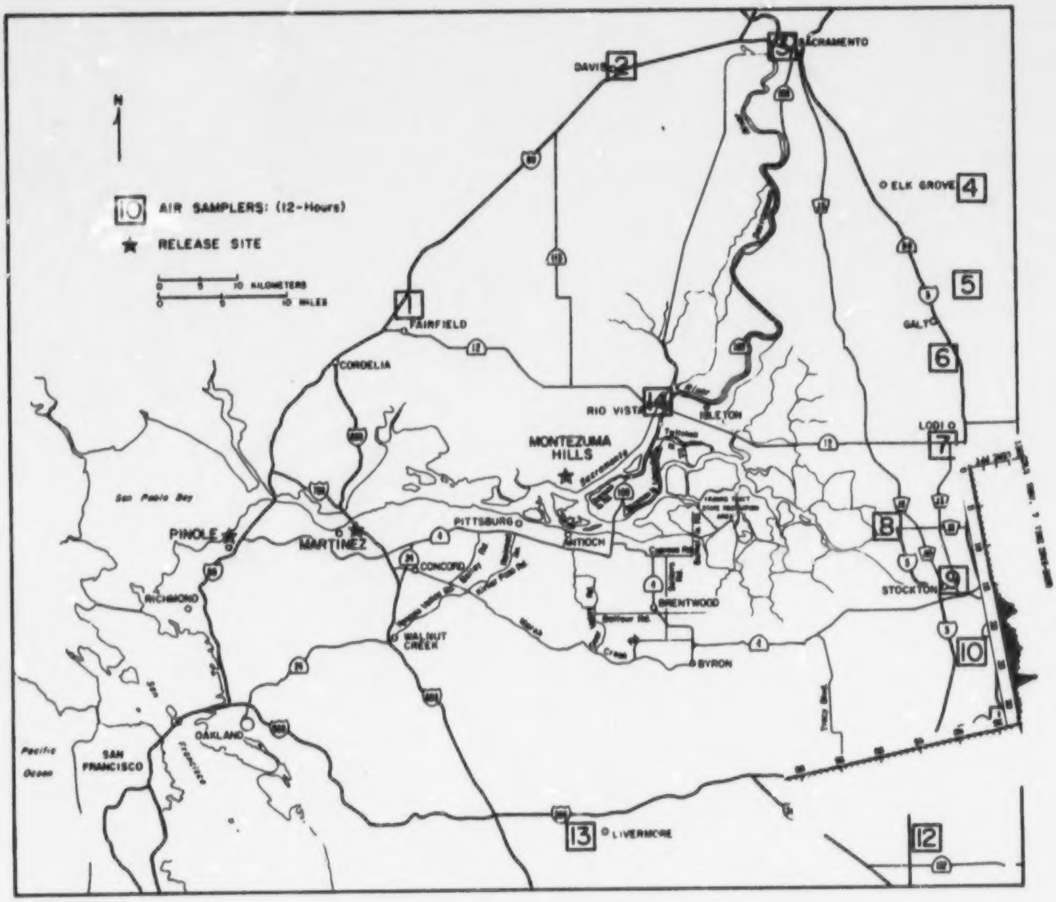

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS
2
SACRAMENTO
3
ELK GROVE
4
5
GALT
6
LODI
7
8
STOCKTON
9
10
1
FAIRFIELD
CORDELIA
RIO VISTA
14
ISLETON
MONTEZUMA HILLS
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
BRENTWOOD
WALNUT CREEK
BYRON
OAKLAND
SAN FRANCISCO
Pacific Ocean
13
LIVERMORE
12

Figure 32.

TEST 4

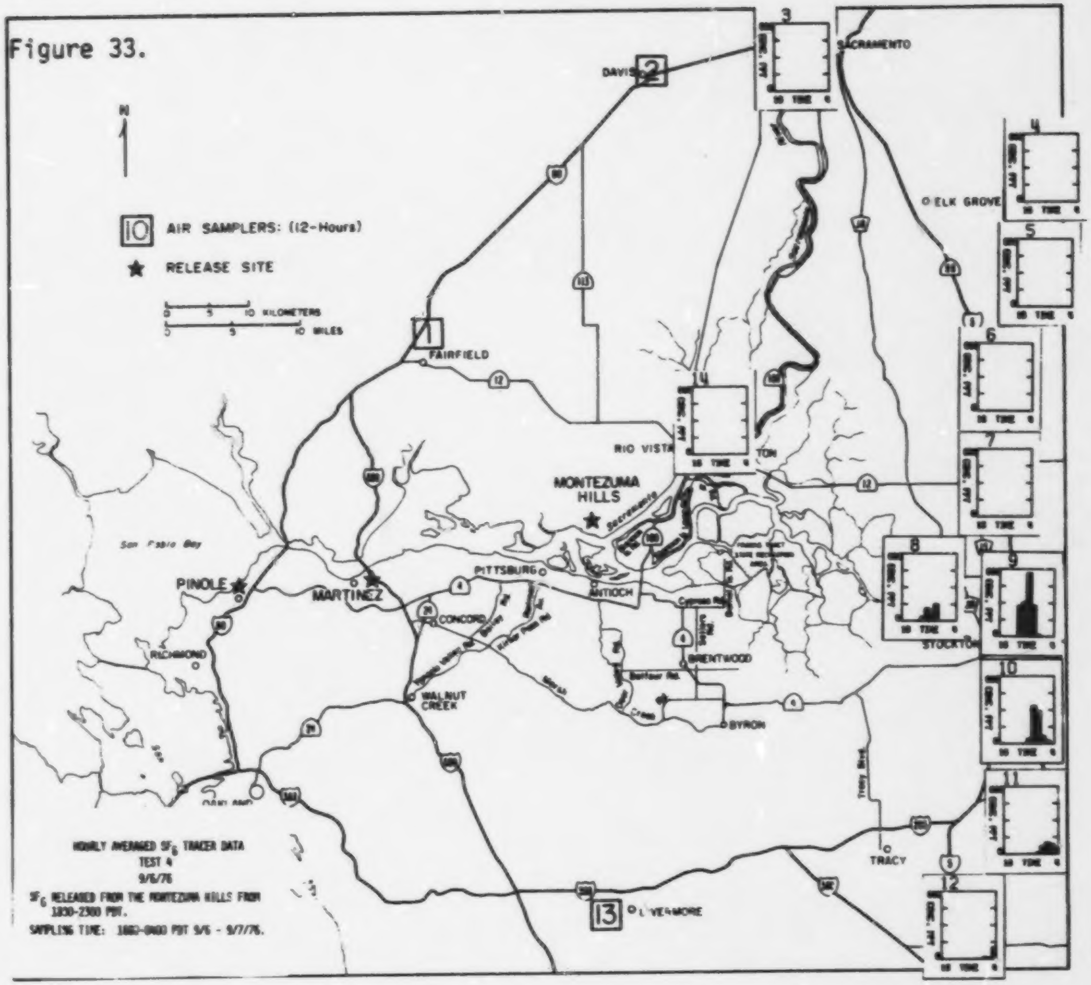
9/6/76

Auto Traverse:

7 2315 - 2400 PDT, SF_6(max) = 553 ppt

SF_6 released from the Montezuma Hills from 1800-2300 PDT.

Figure 33.



N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
HOURLY AVERAGED SF_6 TRACER DATA
TEST 4
9/6/76
SF_6 RELEASED FROM THE MONTEZUMA HILLS FROM 1830-2300 PDT.
SAMPLING TIME: 1800-0600 PDT 9/6 - 9/7/76.
1
2
3
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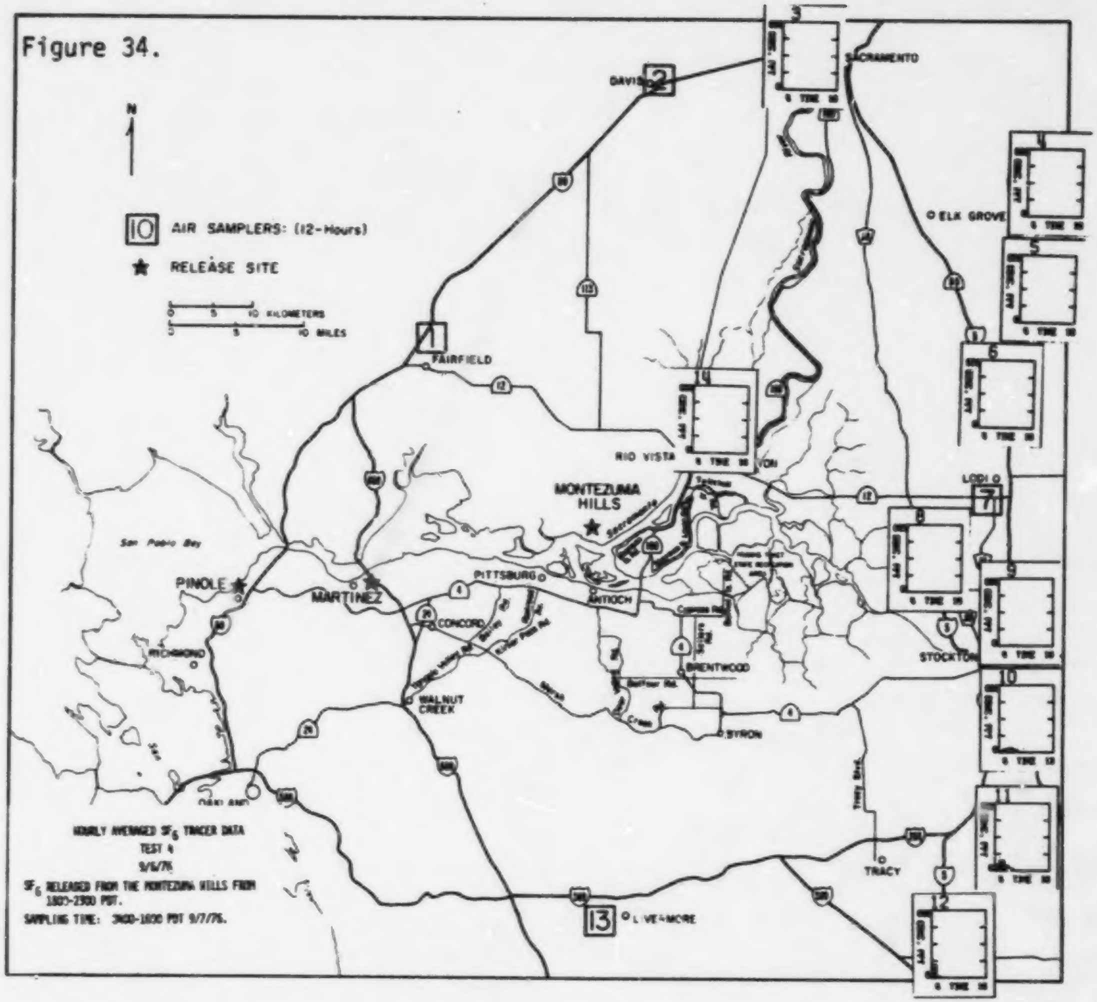
11
12
13
14
CONC. PPT
18 TIME 6
DAVIS
SACRAMENTO
ELK GROVE
FAIRFIELD
RIO VISTA
MONTEZUMA HILLS
PITTSBURG
ANTIOCH
PINOLE
MARTINEZ
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
BYRON
STOCKTON
TRACY
LIVERMORE
OAKLAND
San Pablo Bay
Sacramento

Figure 34.



N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS
SACRAMENTO
ELK GROVE
FAIRFIELD
RIO VISTA
MONTEZUMA HILLS
LODI
STOCKTON
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
BRENTWOOD
WALNUT CREEK
BYRON
RICHMOND
San Pablo Bay
OAKLAND
TRACY
LIVERMORE
1
2
3
4
5
6
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10
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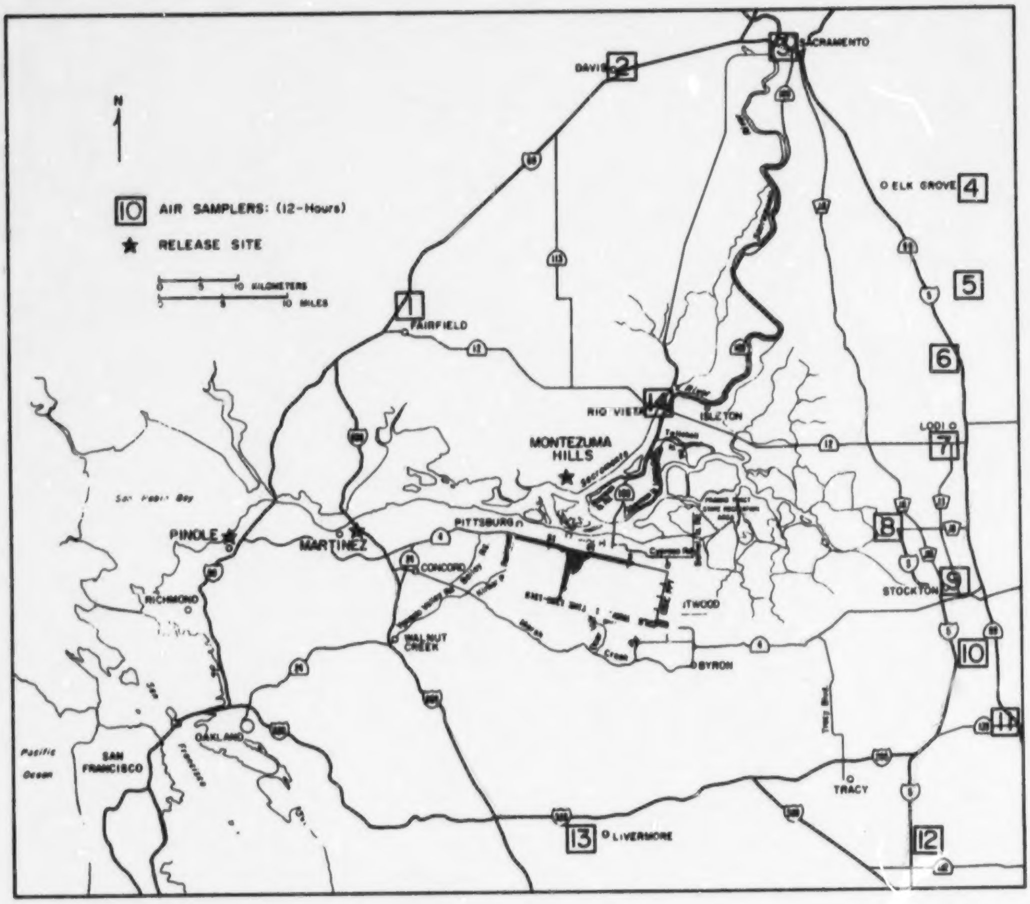
12
13
14

HOURLY AVERAGED SF_6 TRACER DATA
TEST 4
9/6/76

SF_6 RELEASED FROM THE MONTEZUMA HILLS FROM 1800-2300 PDT.

SAMPLING TIME: 2400-1000 PDT 9/7/76.


N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
SACRAMENTO
DAVIS
ELK GROVE
FAIRFIELD
RIO VISTA
ISLETON
MONTEZUMA HILLS
LODI
PINOLE
MARTINEZ
PITTSBURG
CONCORD
RICHMOND
WALNUT CREEK
STOCKTON
BYRON
OAKLAND
SAN FRANCISCO
Pacific Ocean
TRACY
LIVERMORE
1
2
3
4
5
6
7
8
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12
13
14

Figure 35.

TEST 5

9/9/76

Auto Traverse:

1 1255 - 1315 PDT, SF_6(max) = 801 ppt

SF_6 released from the Montezuma Hills from 1130-1330 PDT.

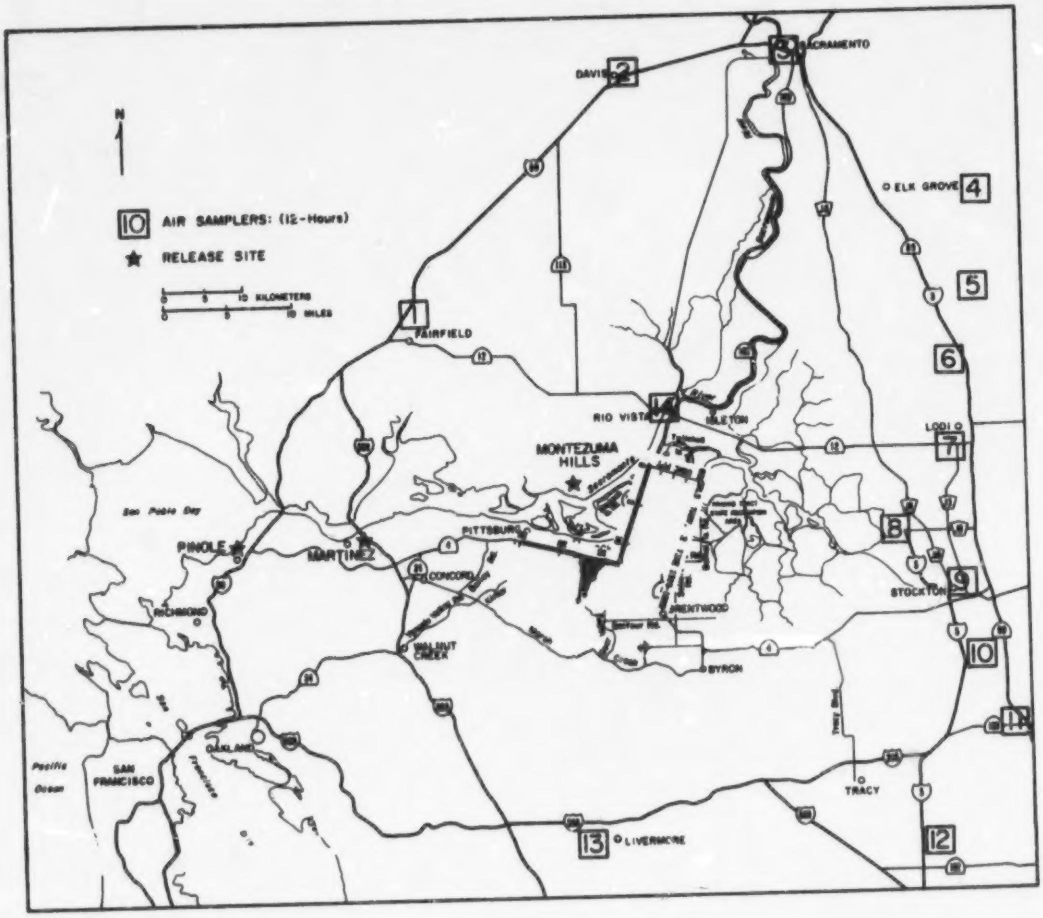

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS 2
3 SACRAMENTO
ELK GROVE 4
5
6
LODI
7
8
STOCKTON 9
10
11
12
13 LIVERMORE
TRACY
BYRON
BRENTWOOD
1 FAIRFIELD
RIO VISTA 14
ISLETON
MONTEZUMA HILLS
PITTSBURG
CONCORD
WALNUT CREEK
MARTINEZ
PINOLE
San Pablo Bay
RICHMOND
OAKLAND
SAN FRANCISCO
Pacific Ocean

Figure 36.

TEST 5

9/9/76

Auto Traverse:

2 1314 - 1330 PDT, SF_6(max) = 528 ppt

SF_6 released from the Montezuma Hills from 1130-1330 PDT.

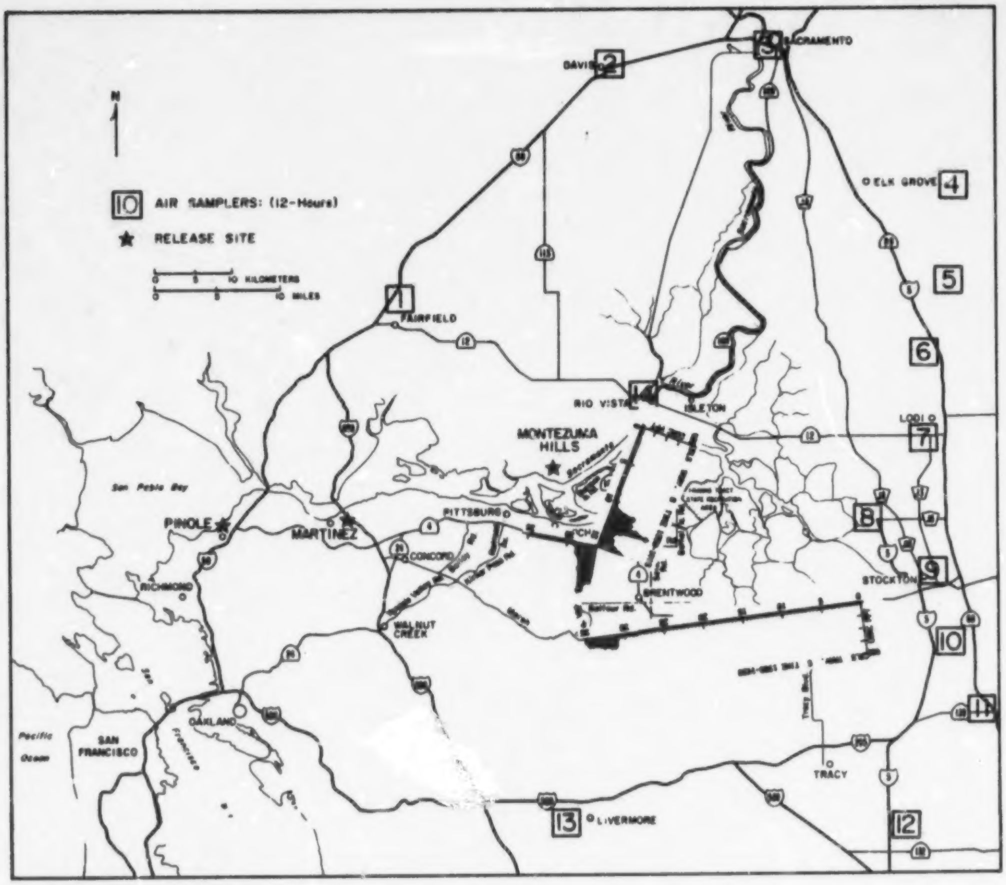

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
1
2
3
4
5
6
7
8
9
10
11
12
13
14
SACRAMENTO
DAVIS
ELK GROVE
FAIRFIELD
RIO VISTA
ISLETON
MONTEZUMA HILLS
LODI
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
CONCORD
BRENTWOOD
STOCKTON
RICHMOND
WALNUT CREEK
OAKLAND
SAN FRANCISCO
Pacific Ocean
TRACY
LIVERMORE

Figure 37.

TEST 5

9/9/76

Auto Traverses:

5 1356-1428 PDT, SF_6(max) = 108 ppt.

6 1359-1416 PDT, SF_6(max) = 445 ppt.

SF_6 released from the Montezuma Hills from 1130-1330 PDT.

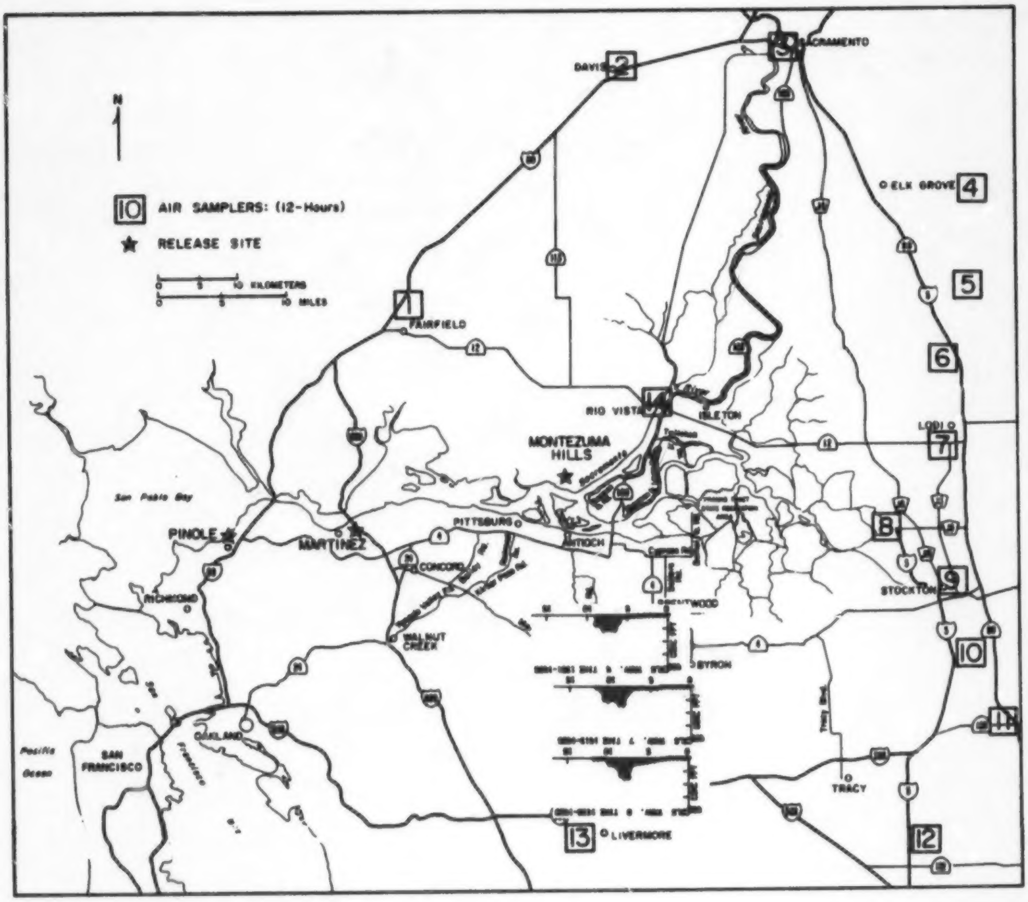

SACRAMENTO
DAVIS
2
3
N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
ELK GROVE
4
5
6
1
FAIRFIELD
14
RIO VISTA
ISLETON
LODI
7
MONTEZUMA HILLS
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
8
CONCORD
RICHMOND
STOCKTON
9
BRENTWOOD
WALNUT CREEK
BYRON
10
11
OAKLAND
Pacific Ocean
SAN FRANCISCO
TRACY
13
LIVERMORE
12

Figure 38.

TEST 5

9/9/76

Auto Traverses:

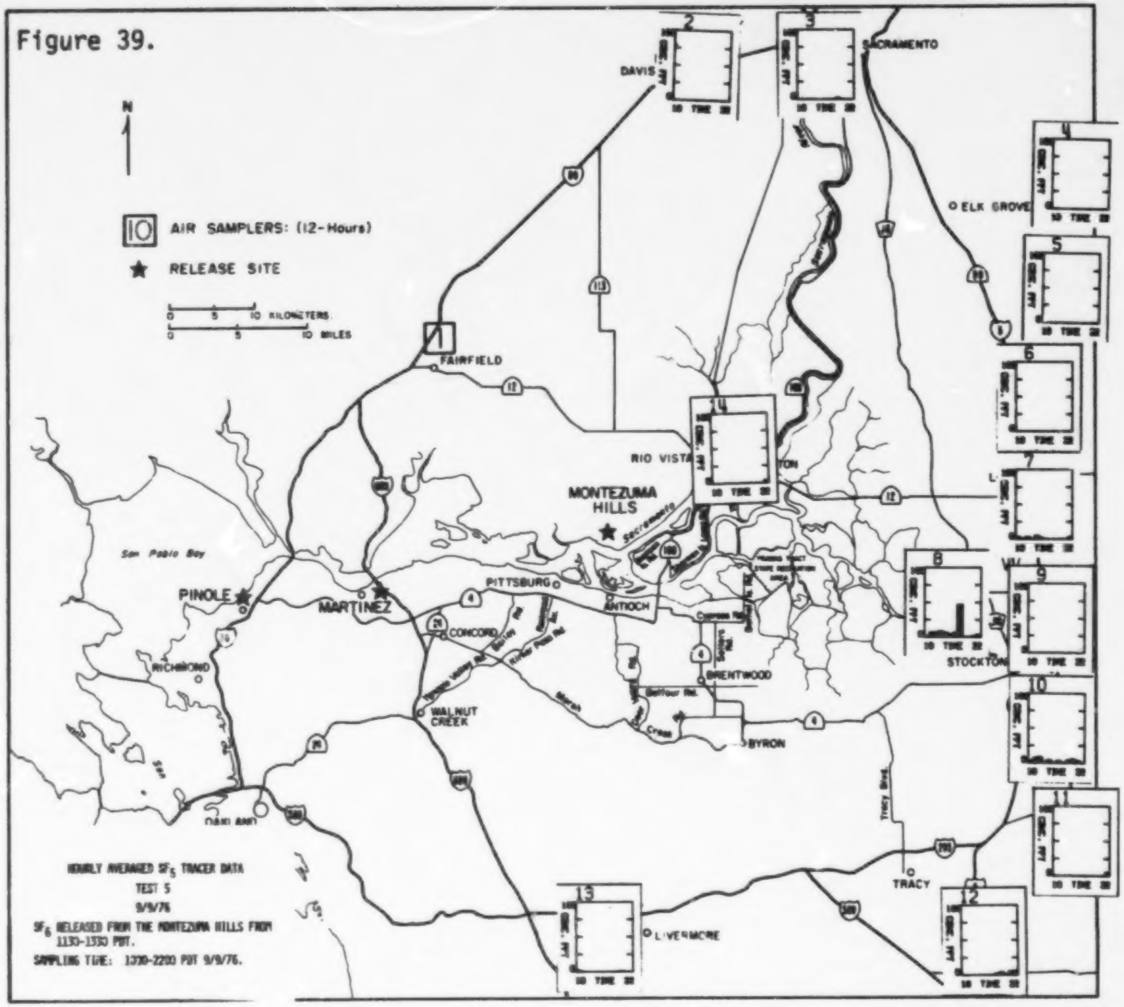
4 1351 - 1405 PDT, SF_6(max) = 138 ppt.

7 1413 - 1426 PDT, SF_6(max) = 141 ppt.

8 1436 - 1450 PDT, SF_6(max) = 183 ppt.

SF_6 released from the Montezuma Hills from 1130-1330 PDT.

Figure 39.


N
AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS
SACRAMENTO
ELK GROVE
FAIRFIELD
RIO VISTA
MONTEZUMA HILLS
Sacramento
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
BRENTWOOD
Balfour Rd.
WALNUT CREEK
BYRON
STOCKTON
Tracy Blvd.
TRACY
LIVERMORE
RICHMOND
OAKLAND
1
2
3
4
5
6
7
8
9
10
11
12
13
CONC. PPT
10 TIME 20

HOURLY AVERAGED SF_6 TRACER DATA

TEST 5

9/9/76

SF_6 RELEASED FROM THE MONTEZUMA HILLS FROM 1130-1330 PDT.

SAMPLING TIME: 1330-2200 PDT 9/9/76.

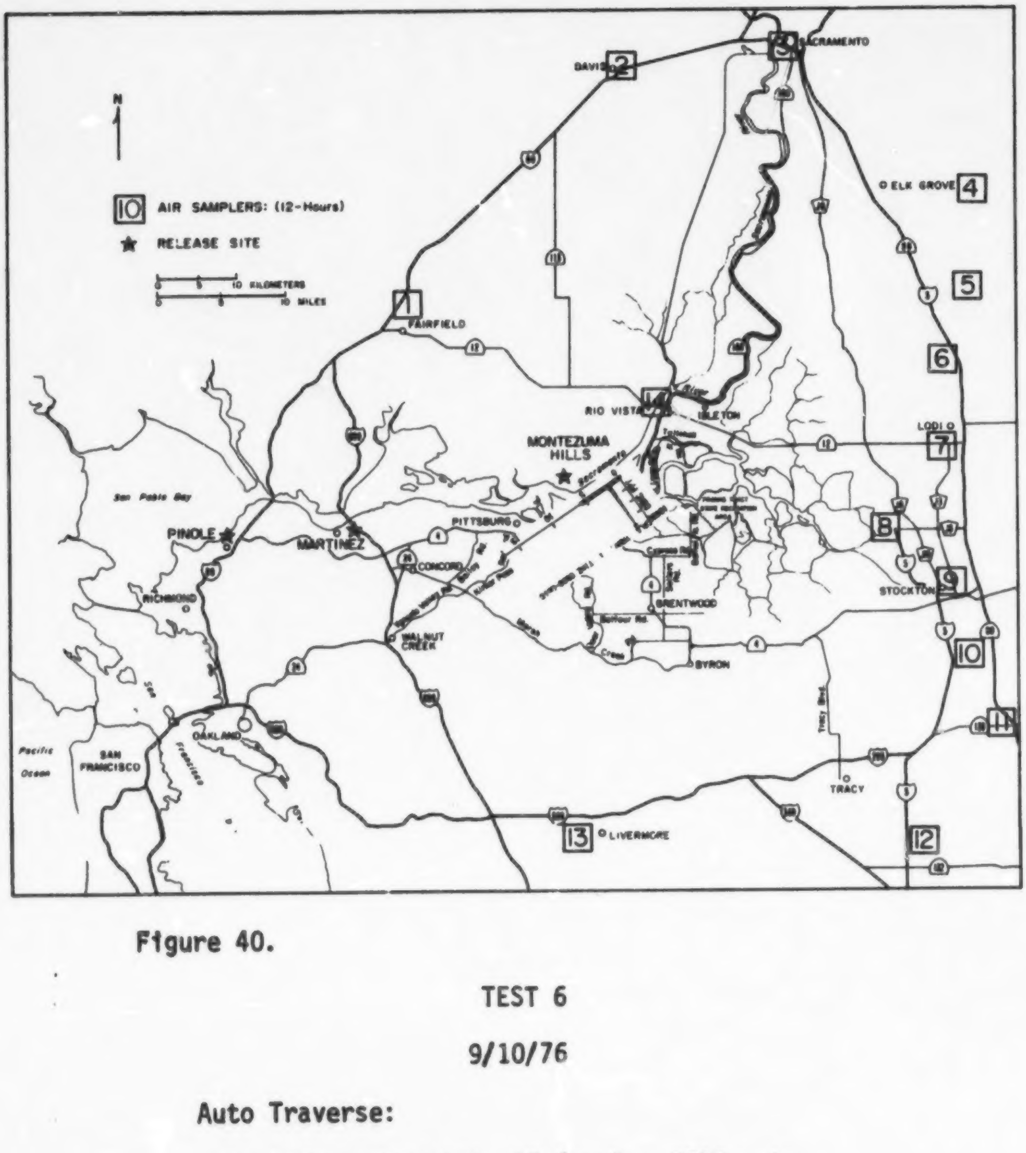

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS 2
3 SACRAMENTO
ELK GROVE 4
5
6
1 FAIRFIELD
RIO VISTA 14
ISLETON
MONTEZUMA HILLS
LODI 7
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
CONCORD
8
STOCKTON 9
RICHMOND
BRENTWOOD
WALNUT CREEK
BYRON
10
11
OAKLAND
Pacific Ocean
SAN FRANCISCO
TRACY
13 LIVERMORE
12

Figure 40.

TEST 6

9/10/76

Auto Traverse:

1 0800 - 0810 PDT, SF_6(max) = 9526 ppt

SF_6 released from the Montezuma Hills from 0600-1100 PDT.

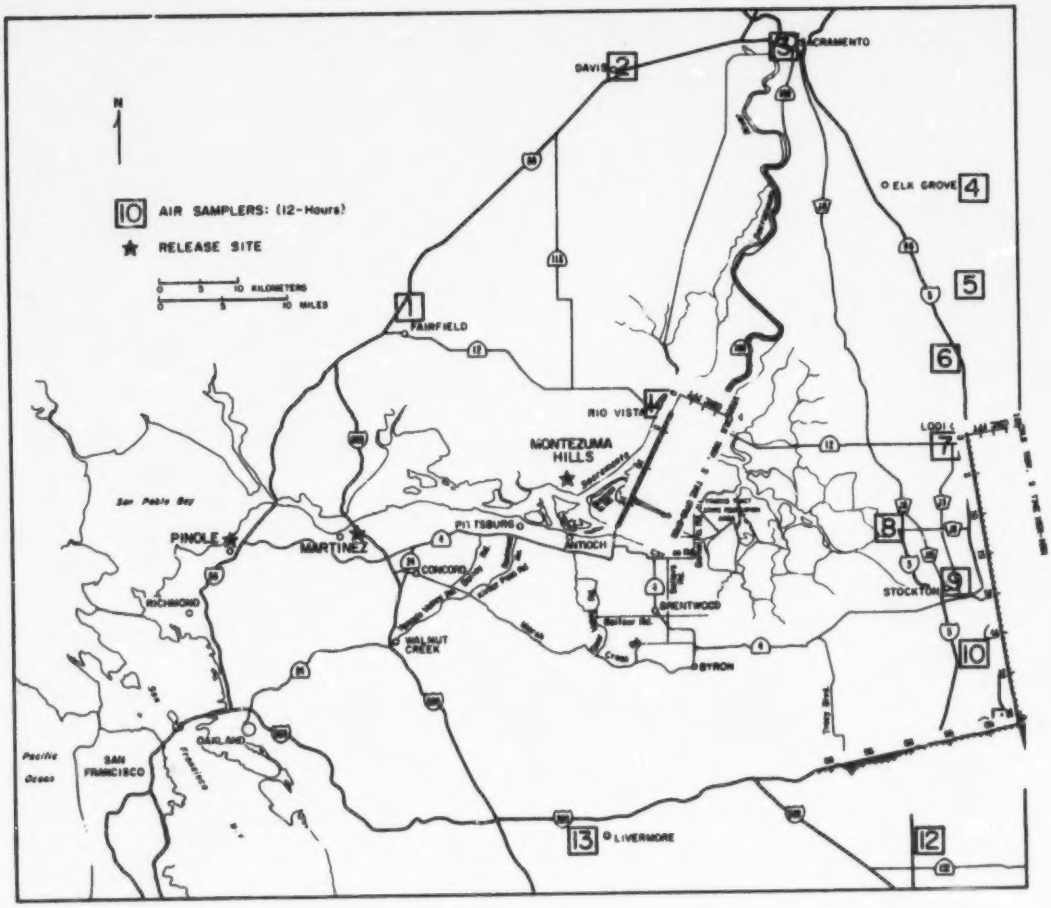

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS
2
SACRAMENTO
3
ELK GROVE
4
5
6
1
FAIRFIELD
RIO VISTA
MONTEZUMA HILLS
LODI
7
8
STOCKTON
9
10
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
BYRON
OAKLAND
Pacific Ocean
SAN FRANCISCO
13
LIVERMORE
12

Figure 41

TEST 6

9/10/76

Auto Traverses:

2 0740 - 0753 PDT, SF_6(max) = 7981 ppt

3 1001 - 1051 PDT, SF_6(max) = 20 ppt

SF_6 released from the Montezuma Hills from 0600-1100 PDT.

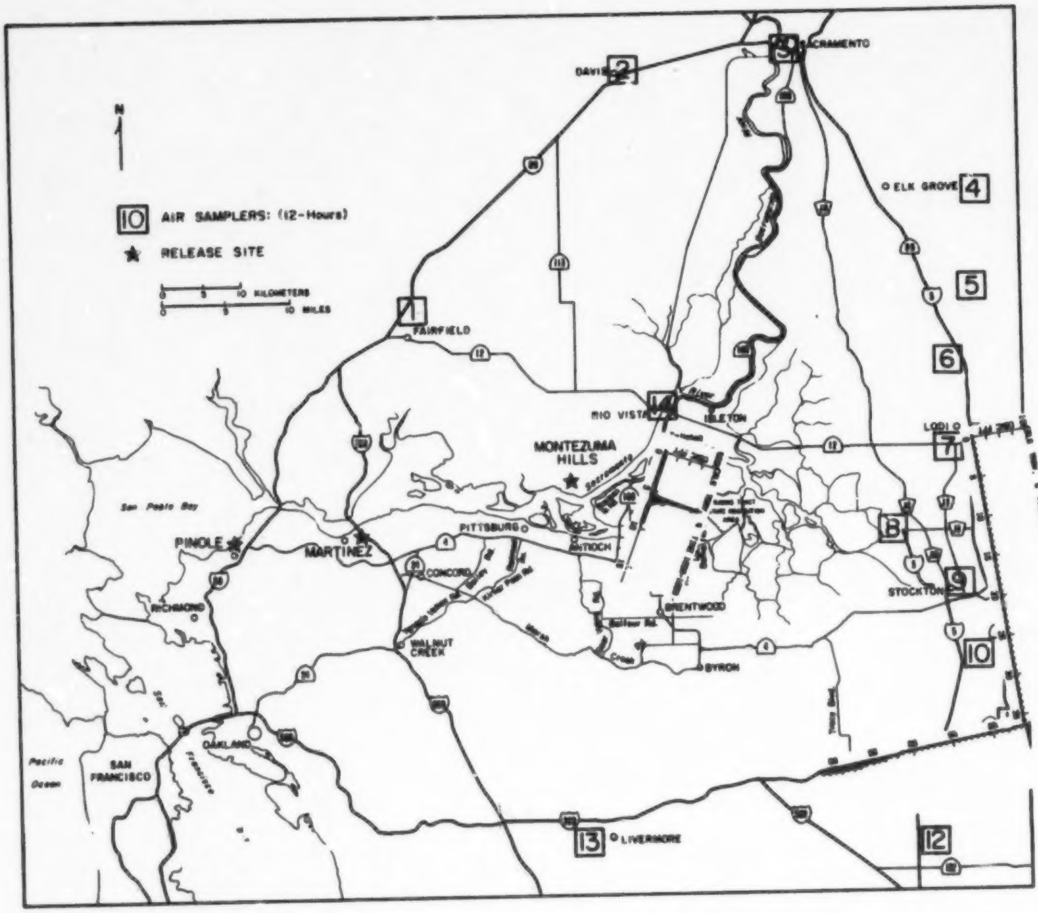

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
SACRAMENTO
3
DAVIS
2
ELK GROVE
4
5
6
1
FAIRFIELD
14
RIO VISTA
ISLETON
MONTEZUMA HILLS
LODI
7
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
8
CONCORD
RICHMOND
STOCKTON
9
BRENTWOOD
WALNUT CREEK
BYRON
10
Pacific Ocean
SAN FRANCISCO
OAKLAND
13
LIVERMORE
12

Figure 42.

TEST 6

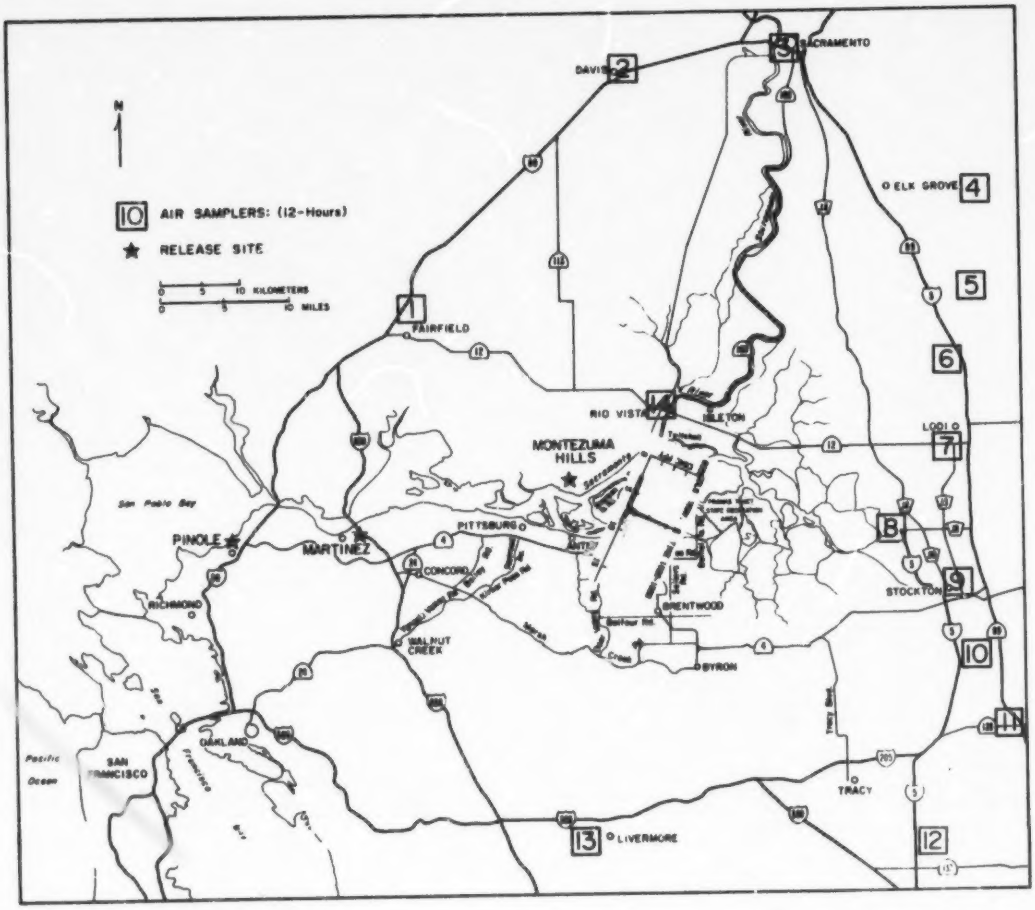
9/10/76

Auto Traverses:

4 1023 - 1033 PDT, SF_6(max) = 3739 ppt

5 1030 - 1115 PDT, SF_6(max) = 11 ppt

SF_6 released from the Montezuma Hills from 0600-1100 PDT.


N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
SACRAMENTO
DAVIS
ELK GROVE
FAIRFIELD
RIO VISTA
ISLETON
MONTEZUMA HILLS
LODI
PINOLE
MARTINEZ
PITTSBURG
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
BYRON
STOCKTON
OAKLAND
SAN FRANCISCO
Pacific Ocean
San Pablo Bay
TRACY
LIVERMORE
1
2
3
4
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7
8
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10
11
12
13
14

Figure 43.

TEST 6

9/10/76

Auto Traverse:

6 1022 - 1033 PDT, SF_6(max) = 5954 ppt

SF_6 released from the Montezuma Hills from 0600-1100 PDT.

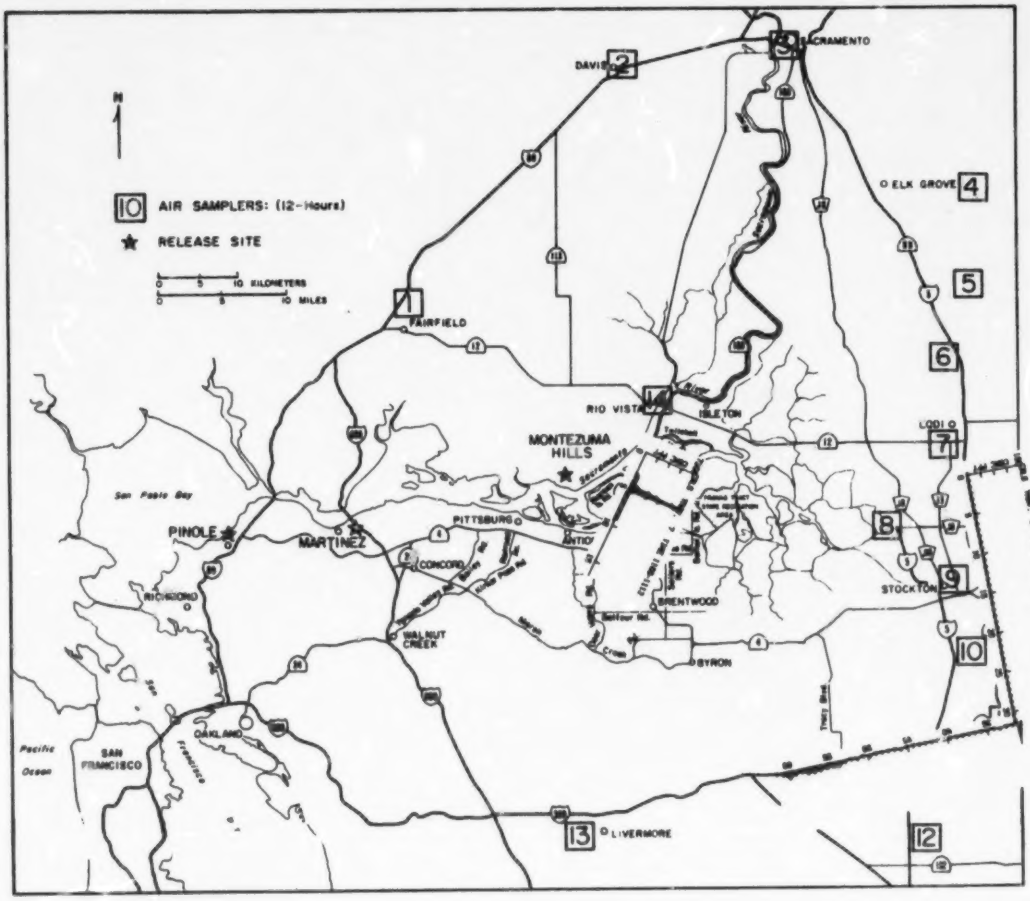

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
SACRAMENTO
3
DAVIS
2
ELK GROVE
4
5
6
FAIRFIELD
1
RIO VISTA
14
ISLETON
LODI
7
MONTEZUMA HILLS
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
8
STOCKTON
9
RICHMOND
BRENTWOOD
WALNUT CREEK
10
BYRON
OAKLAND
Pacific Ocean
SAN FRANCISCO
13
LIVERMORE
12

Figure 44.

TEST 6

9/10/76

Auto Traverses:

7 1103 - 1112 PDT, SF_6(max) = 7155 ppt

8 1105 - 1203 PDT, SF_6(max) = 12 ppt

SF_6 released from the Montezuma Hills from 0600-1100 PDT.

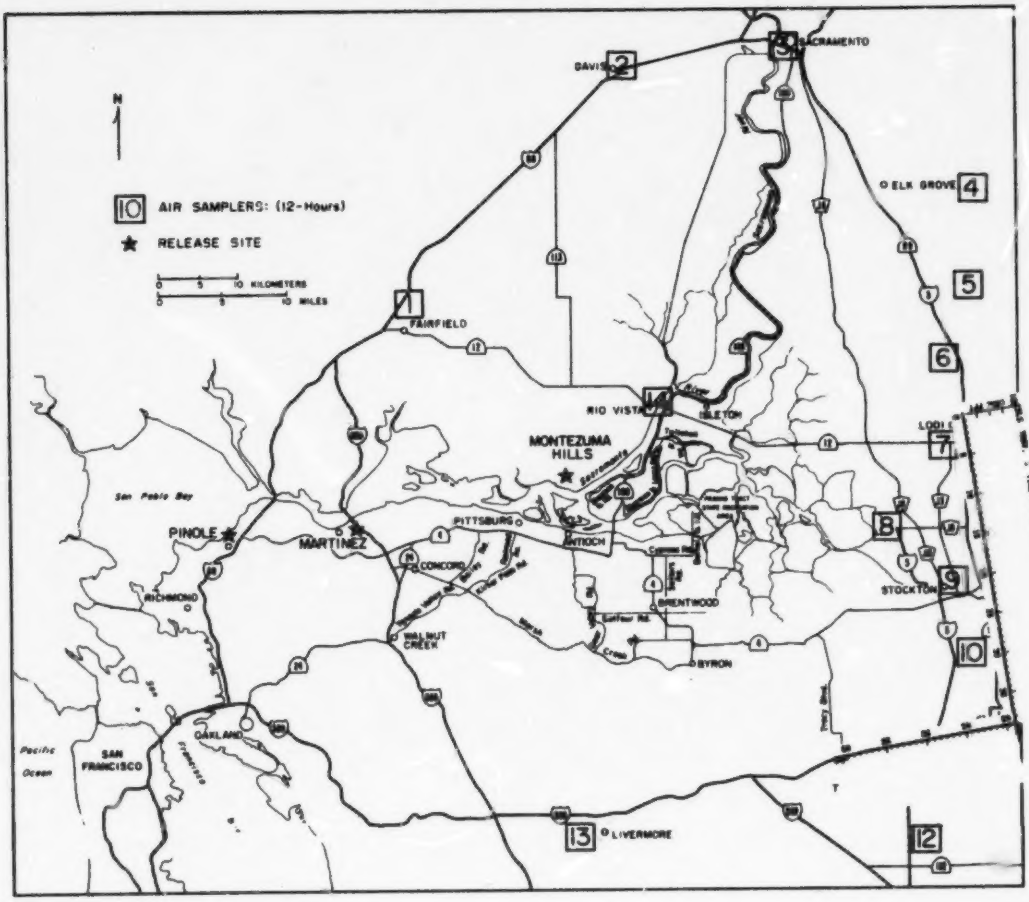

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS 2
3 SACRAMENTO
ELK GROVE 4
5
6
1
FAIRFIELD
RIO VISTA 14
ISLETON
MONTEZUMA HILLS
LODI
7
8
STOCKTON 9
10
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
BYRON
OAKLAND
SAN FRANCISCO
Pacific Ocean
13 LIVERMORE
12

Figure 45.

TEST 6

9/10/76

Auto Traverse:

9 1145 - 1230 PDT, SF_6(max) = 10 ppt

SF_6 released from the Montezuma Hills from 0600-1100 PDT.

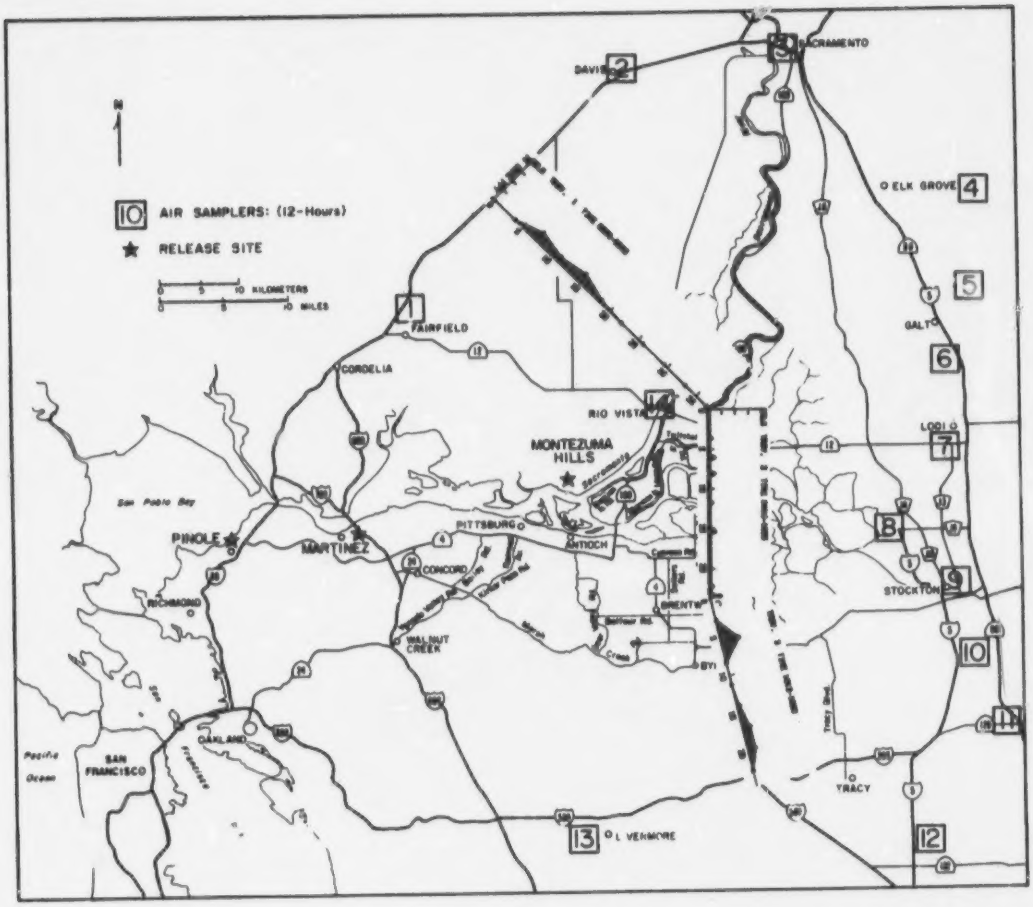

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
1
2
3
4
5
6
7
8
9
10
11
12
13
14
SACRAMENTO
DAVIS
ELK GROVE
GALT
LODI
STOCKTON
TRACY
FAIRFIELD
CORDELIA
RIO VISTA
MONTEZUMA HILLS
Sacramento
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
BYI
Tracy Blvd
OAKLAND
SAN FRANCISCO
Pacific Ocean
San Francisco
L VERMORE

Figure 46.

TEST 6

9/10/76

Airborne Traverses:

1 0934 - 0946 PDT, 305 m, SF_6(max) = 4 ppt
2 0950 - 1005 PDT, 305 m, SF_6(max) = 4 ppt
3 1012 - 1020 PDT, 305 m, SF_6(max) = 7 ppt

SF_6 released from the Montezuma Hills from 0600-1100 PDT.

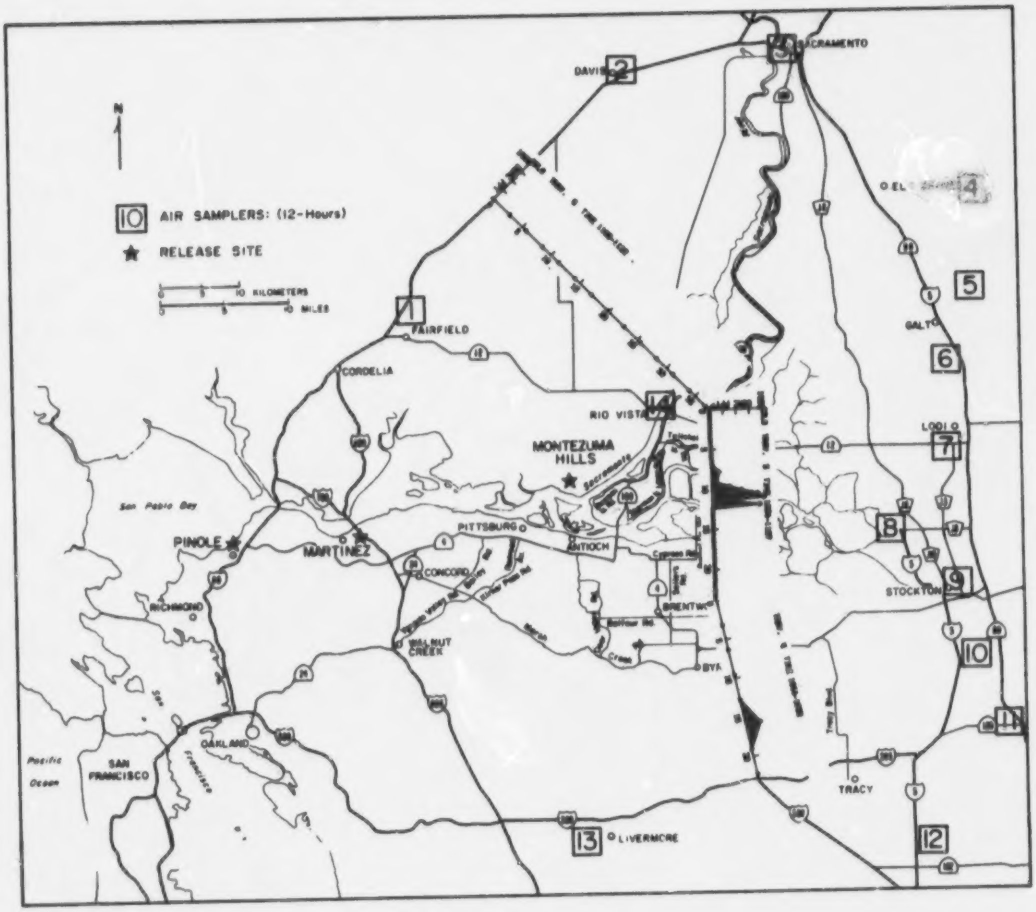

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS
2
SACRAMENTO
ELK GROVE
4
5
GALT
6
LODI
7
8
STOCKTON
9
10
11
TRACY
12
13
LIVERMORE
1
FAIRFIELD
CORDELIA
14
RIO VISTA
MONTEZUMA HILLS
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
BRENTWOOD
BYRON
RICHMOND
WALNUT CREEK
OAKLAND
SAN FRANCISCO
Pacific Ocean

Figure 47.

TEST 6

9/10/76

Airborne Traverses:

4 1044 - 1052 PDT, 183 m, SF_6(max) = 396 ppt

5 1054 - 1107 PDT, 183 m, SF_6(max) = 1387 ppt

6 1109 - 1122 PDT, 183 m, SF_6(max) = 0 ppt

SF_6 released from the Montezuma Hills from 0600-1100 PDT.

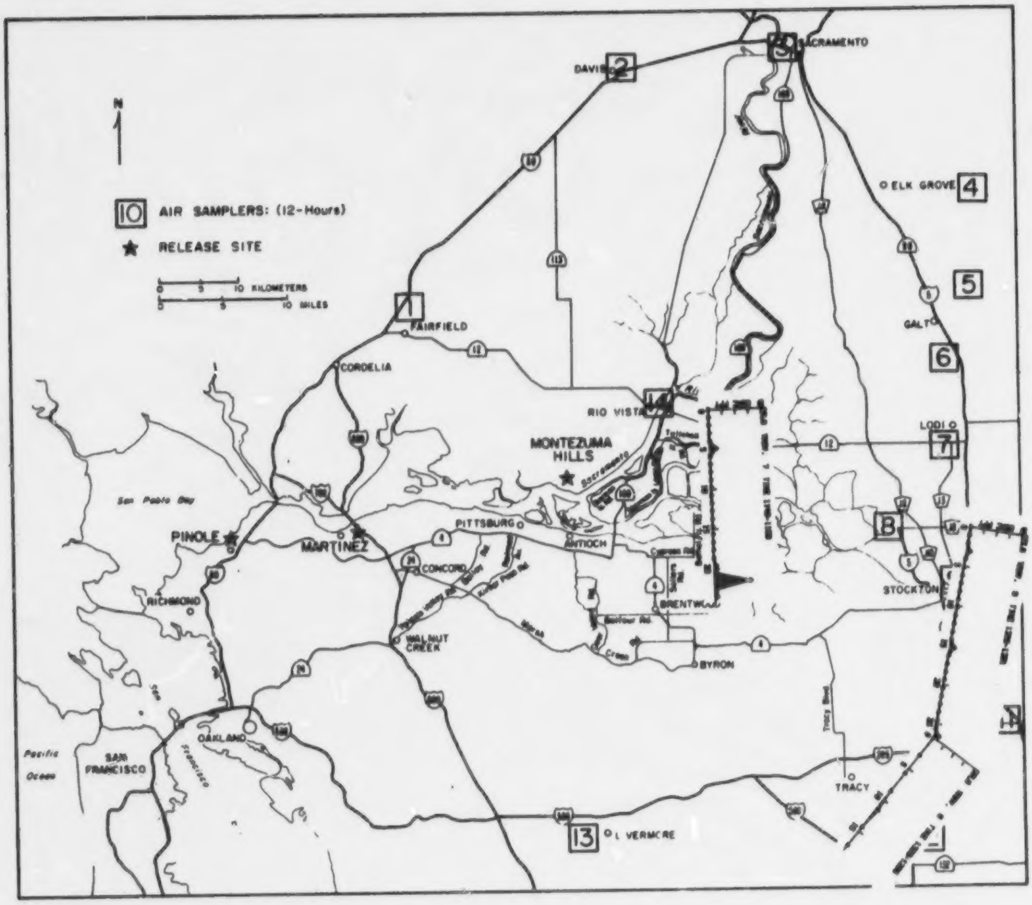

N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
SACRAMENTO
DAVIS
2
3
ELK GROVE
4
5
GALT
6
LODI
7
8
STOCKTON
1
FAIRFIELD
CORDELIA
RIO VISTA
14
MONTEZUMA HILLS
Sacramento
PITTSBURG
ANTIOCH
BRENTWOOD
BYRON
San Pablo Bay
PINOLE
MARTINEZ
CONCORD
RICHMOND
WALNUT CREEK
Pacific Ocean
SAN FRANCISCO
OAKLAND
TRACY
13
L VERMORE
12
4
24

Figure 48.

TEST 6

9/10/76

Airborne Traverses:

7 1140 - 1153 PDT, 427 m, SF_6(max) = 33 ppt

8 1229 - 1235 PDT, 305 m, SF_6(max) = 2 ppt

9 1238 - 1251 PDT, 305 m, SF_6(max) = 4 ppt

SF_6 released from the Montezuma Hills from 0600-1100 PDT.

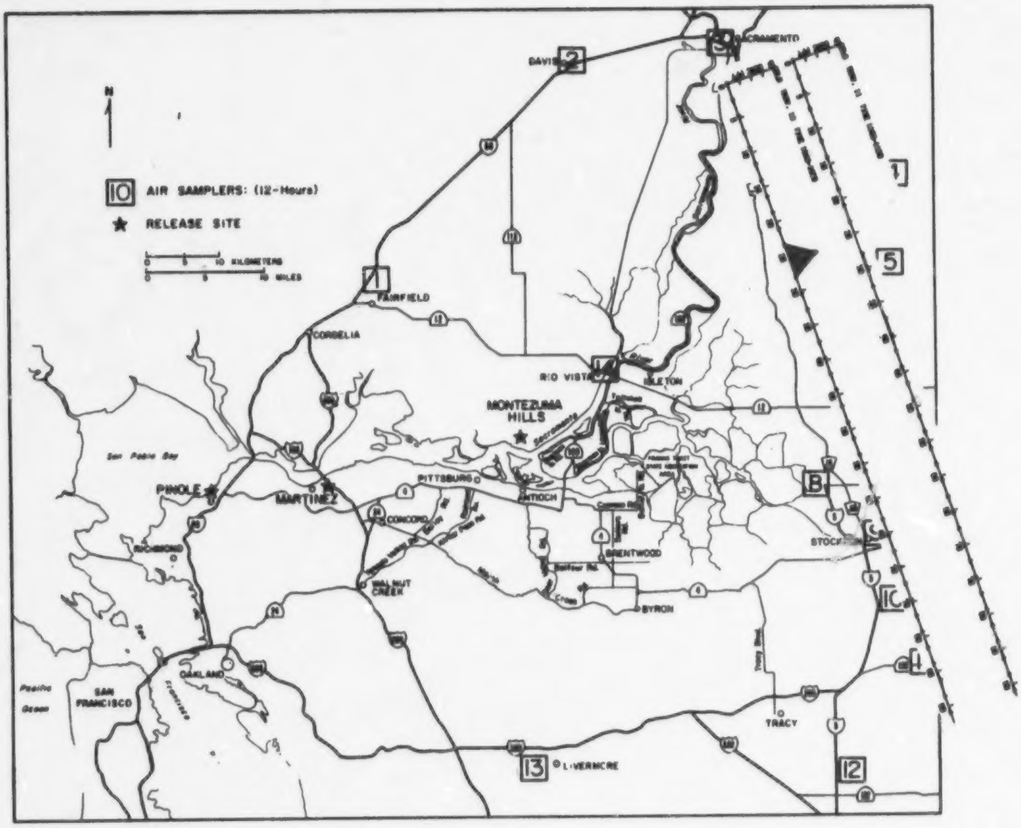

N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
SACRAMENTO
DAVIS
2
3
1
5
7
FAIRFIELD
CORDELIA
RIO VISTA
14
ISLETON
MONTEZUMA HILLS
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
BRENTWOOD
WALNUT CREEK
BYRON
RICHMOND
OAKLAND
SAN FRANCISCO
Pacific Ocean
STOCKTON
B
10
TRACY
13
LIVERMORE
12

Figure 49.

TEST 6

9/10/76

Airborne Traverses:

10 1000 - 1039 PDT, 183 m, SF_6(max) = 27 ppt

11 1100 - 1139 PDT, 183 m, SF_6(max) = 1 ppt

SF_6 released from the Montezuma Hills from 0600-1100 PDT.

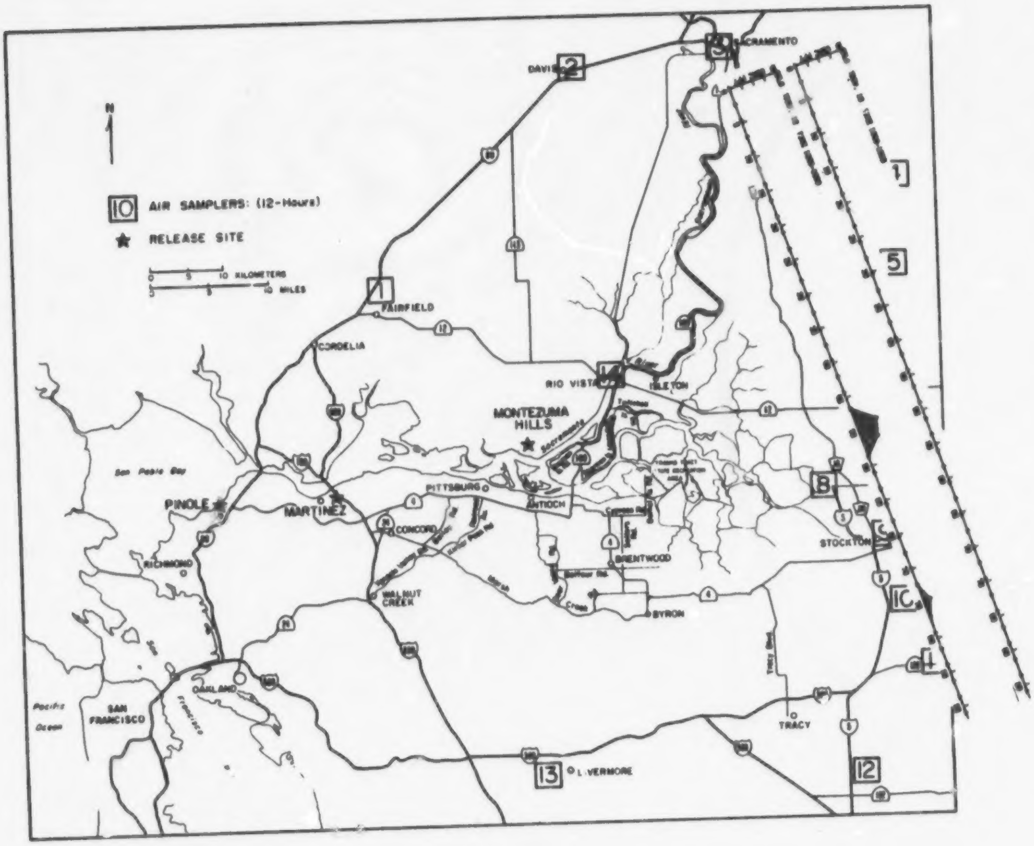

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
SACRAMENTO
DAVIS
2
1
5
FAIRFIELD
CORDELIA
RIO VISTA
ISLETON
MONTEZUMA HILLS
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
BYRON
B
C
STOCKTON
10
TRACY
OAKLAND
SAN FRANCISCO
Pacific Ocean
13
L.VERMORE
12

Figure 50.

TEST 6

9/10/76

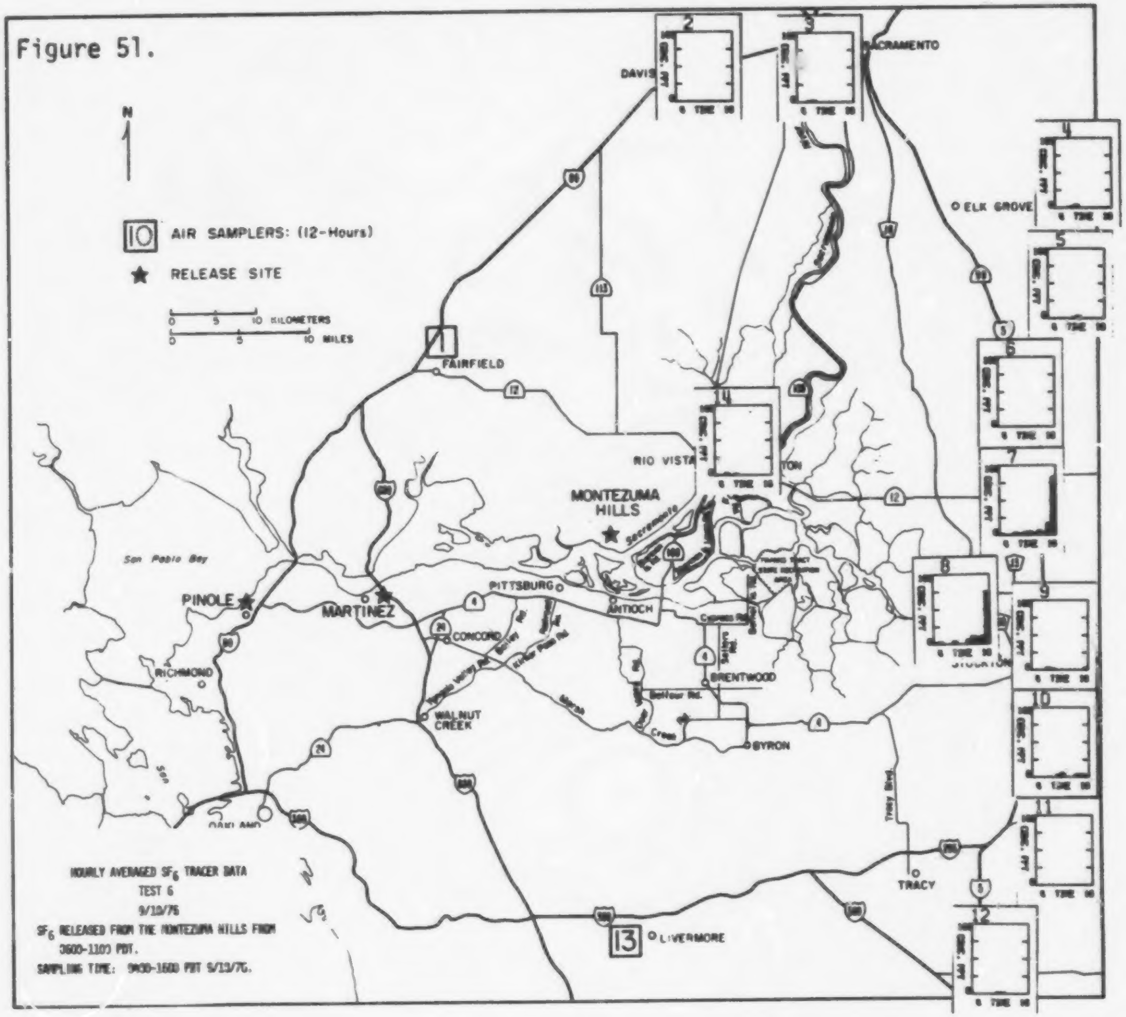
Airborne Traverses:

12 1200 - 1239 PDT, 183 m, $SF_6(max)$ = 21 ppt

13 1300 - 1339 PDT, 183 m, $SF_6(max)$ = 0 ppt

SF_6 released from the Montezuma Hills from 0600-1100 PDT.

Figure 51.


N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
1
2
3
4
5
6
7
8
9
10
11
12
13
14
CONC. PPT
0 TIME 30
DAVIS
SACRAMENTO
ELK GROVE
FAIRFIELD
RIO VISTA
MONTEZUMA HILLS
Sacramento
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
BYRON
STOCKTON
TRACY
LIVERMORE
OAKLAND
Balfour Rd.
Tracy Blvd.
80
113
12
680
4
24
160
99
5
580

HOURLY AVERAGED SF_6 TRACER DATA
TEST 6
9/13/76
SF_6 RELEASED FROM THE MONTEZUMA HILLS FROM
0600-1100 PDT.
SAMPLING TIME: 0900-1600 PDT 9/13/76.

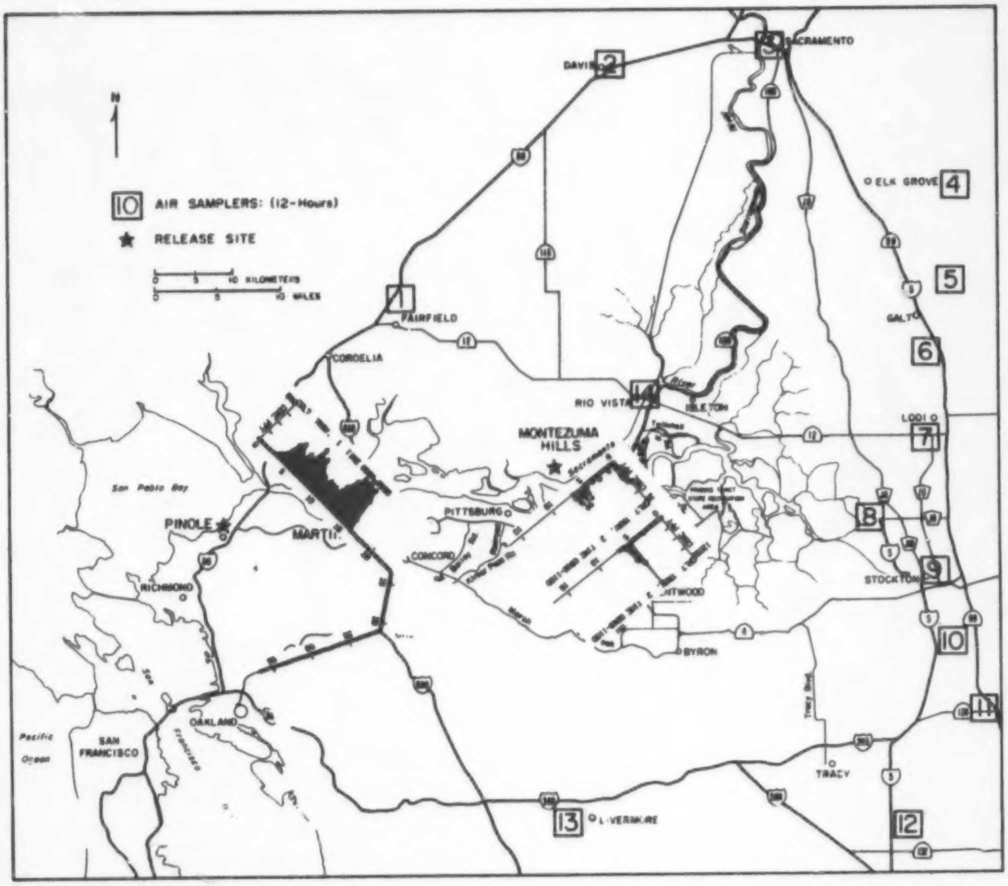

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
SACRAMENTO
DAVIS
2
3
ELK GROVE
4
5
GALT
6
1
FAIRFIELD
CORDELIA
RIO VISTA
14
River
ISLETON
LODI
7
MONTEZUMA
HILLS
Sacramento
San Pablo Bay
PINOLE
MARTI
PITTSBURG
CONCORD
8
STOCKTON
9
RICHMOND
BRENTWOOD
BYRON
10
11
OAKLAND
Pacific
Ocean
SAN
FRANCISCO
San
Francisco
TRACY
Tracy Blvd.
12
13
LIVERMORE

Figure 52.

TEST 7

9/13/76

Auto Traverses:

1 0924-0925 PDT, SF_6(max) = 614 ppt.

2 0940-1100 PDT, SF_6(max) = 11 ppt.

0940-1100 PDT, $CBrF_3$(max) = 12,140 ppt.

SF_6 released from Pinole from 0600-1500 PDT.

$CBrF_3$ released from the Montezuma Hills from 0900-1100 PDT, and from 1300-1400 PDT.

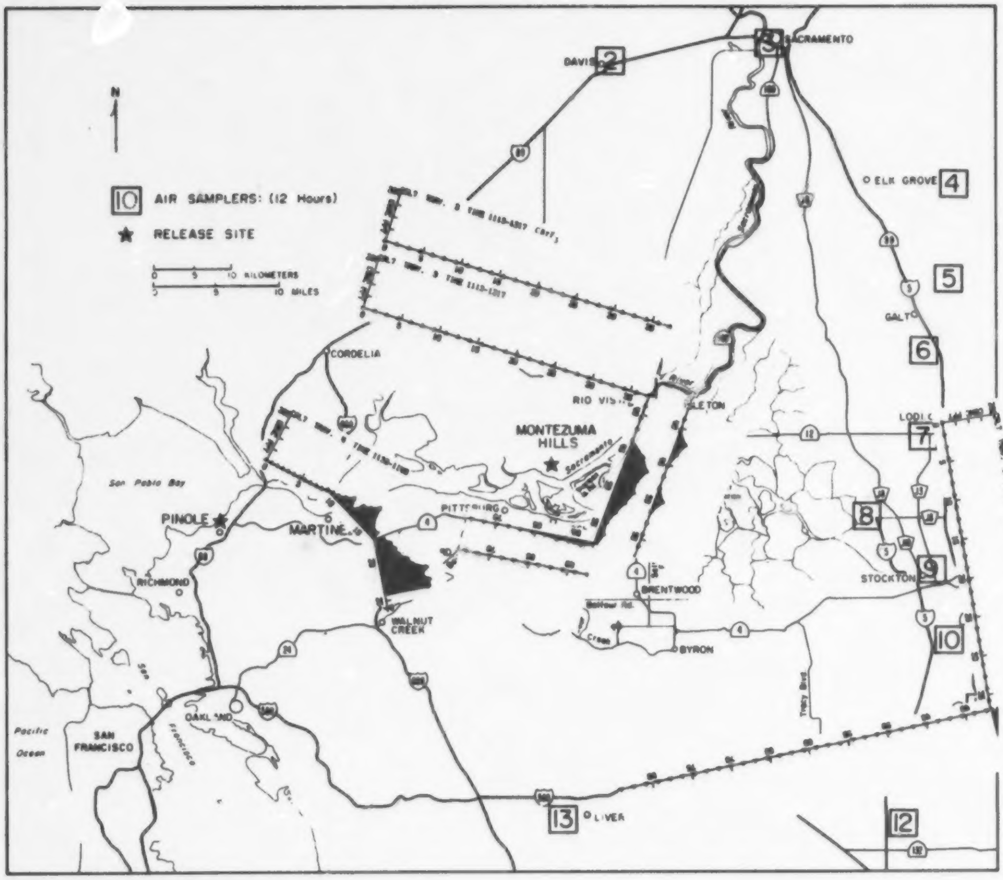

N
10 AIR SAMPLERS: (12 Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS
2
SACRAMENTO
3
ELK GROVE
4
5
GALT
6
LODI
7
8
STOCKTON
9
10
12
13
LIVER
CORDELIA
RIO VISTA
MONTEZUMA HILLS
Sacramento
River
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
RICHMOND
BRENTWOOD
WALNUT CREEK
BYRON
OAKLAND
SAN FRANCISCO
Pacific Ocean
San Francisco
Tracy Blvd
CBrF3

Figure 53.

TEST 7

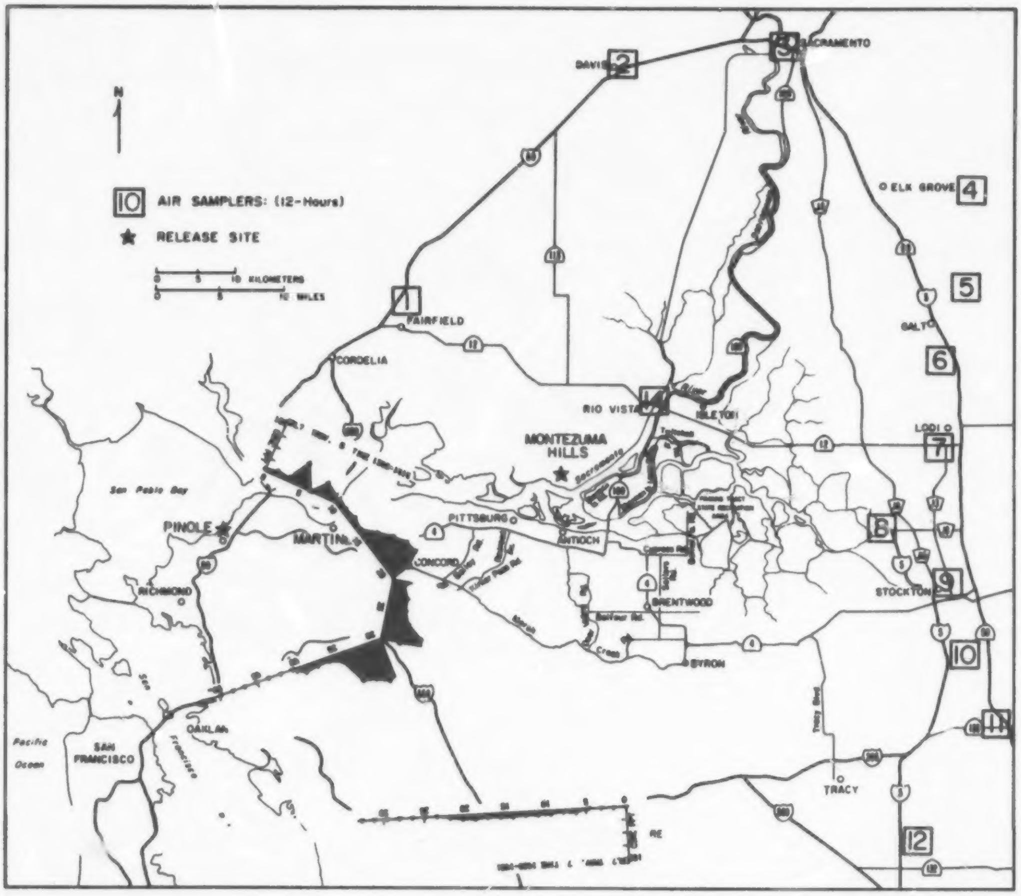
9/13/76

Auto Traverses:

3 1113-1217 PDT, SF_6(max) = 94 ppt.
1113-1217 PDT, $CBrF_3$(max) = 37 ppt.
4 1130-1146 PDT, SF_6(max) = 180 ppt.
5 1335-1458 PDT, SF_6(max) = 3 ppt.

SF_6 released from Pinole from 0600-1500 PDT.

$CBrF_3$ released from the Montezuma Hills from 0900-1100 PDT and from 1300-1400 PDT.


N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
SACRAMENTO
DAVIS
ELK GROVE
FAIRFIELD
CORDELIA
GALT
RIO VISTA
ISLETON
LODI
MONTEZUMA HILLS
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
BRENTWOOD
Balfour Rd.
STOCKTON
BYRON
Marsh Creek
Tracy Blvd
TRACY
Pacific Ocean
SAN FRANCISCO
San Francisco
OAKLAND
1
2
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10
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14
RE

Figure 54.

TEST 7

9/13/76

Auto Traverse:

6 1340 - 1414 PDT, SF_6(max) = 131 ppt

SF_6 released from Pinole from 0600-1500 PDT.

$CBrF_3$ released from the Montezuma Hills from 0900-1100 PDT, and from 1300-1400 PDT.

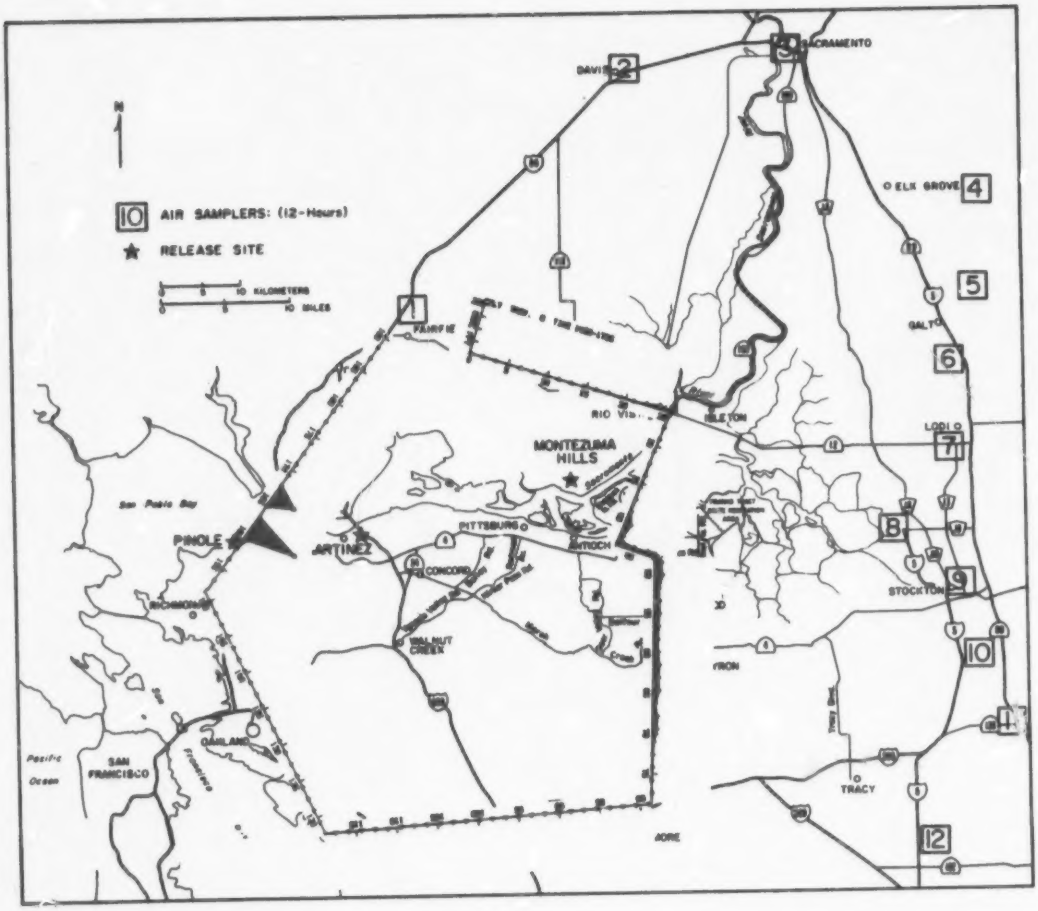

N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
SACRAMENTO
DAVIS
2
3
ELK GROVE
4
5
GALT
6
LODI
7
8
STOCKTON
9
10
11
12
TRACY
1
FAIRFIELD
RIO VISTA
ISLETON
MONTEZUMA HILLS
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
WALNUT CREEK
RICHMOND
OAKLAND
SAN FRANCISCO
Pacific Ocean

Figure 55.

TEST 7

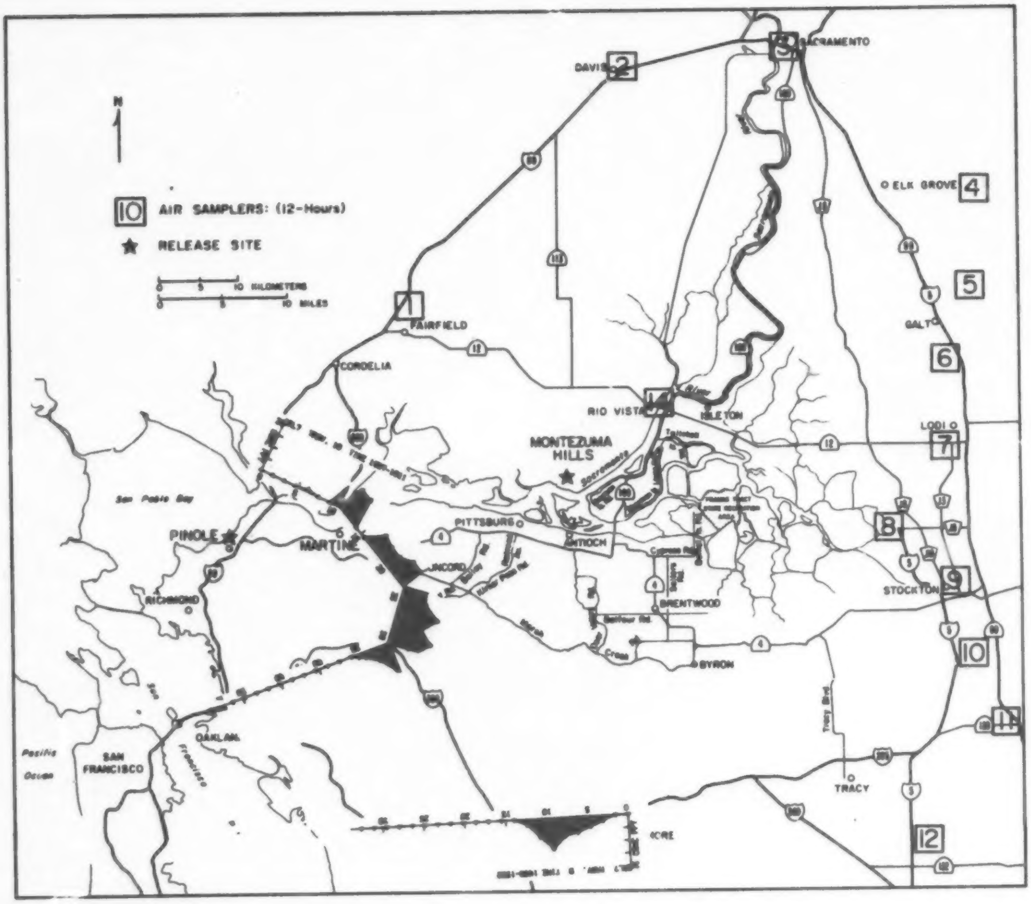
9/13/76

Auto Traverse:

8 1450 - 1706 PDT, SF_6(max) = 200 ppt

SF_6 released from Pinole from 0600-1500 PDT.

$CBrF_3$ released from the Montezuma Hills from 0900-1100 PDT, and from 1300-1400 PDT.


N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
KILOMETERS
MILES
SACRAMENTO
DAVIS
ELK GROVE
GALT
FAIRFIELD
CORDELIA
RIO VISTA
ISLETON
MONTEZUMA HILLS
LODI
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
BRENTWOOD
STOCKTON
BYRON
RICHMOND
OAKLAND
SAN FRANCISCO
Pacific Ocean
TRACY
1
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7
8
9
10
11
12
14

Figure 56.

TEST 7

9/13/76

Auto Traverses:

9 1458 - 1522 PDT, SF_6(max) = 12 ppt.

10 1537 - 1611 PDT, SF_6(max) = 16 ppt.

SF_6 released from Pinole from 0600-1500 PDT.

$CBrF_3$ released from the Montezuma Hills from 0900-1100 PDT and from 1300-1400 PDT.

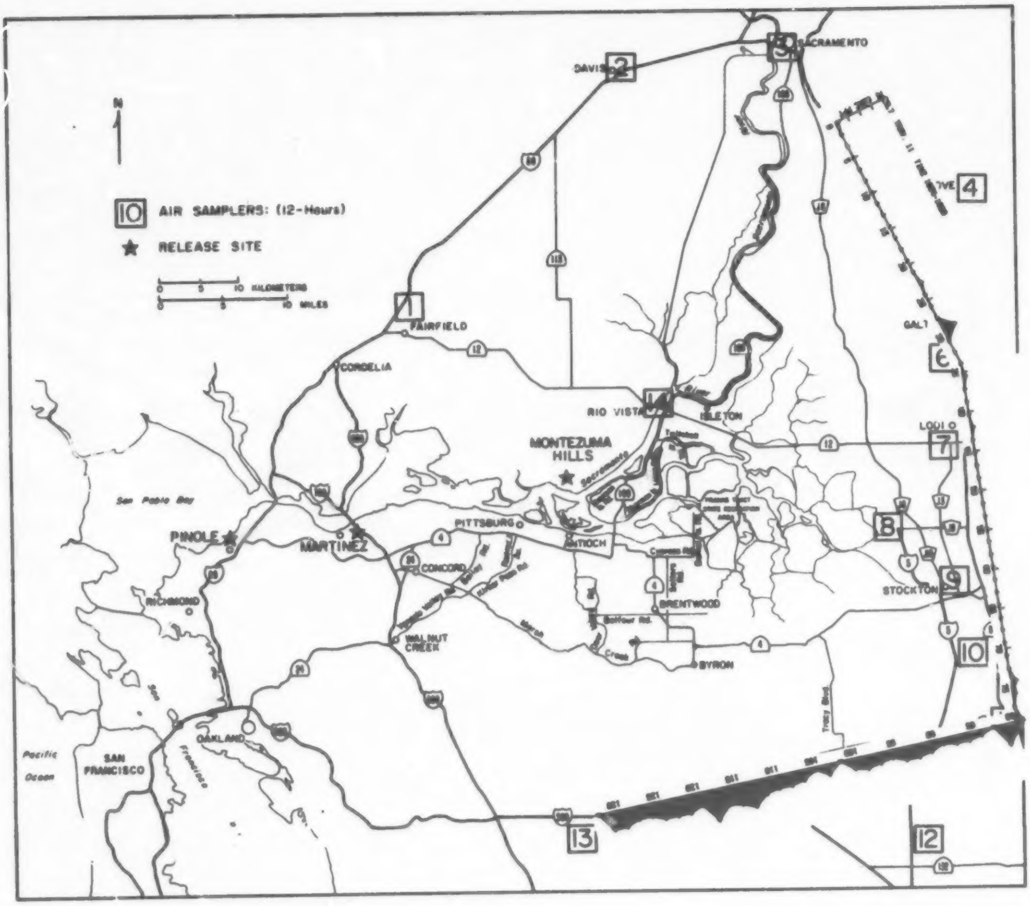

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
1
2
3
4
6
7
8
9
10
12
13
14
DAVIS
SACRAMENTO
FAIRFIELD
CORDELIA
RIO VISTA
ISLETON
GALT
LODI
MONTEZUMA HILLS
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
BRENTWOOD
WALNUT CREEK
BYRON
STOCKTON
OAKLAND
SAN FRANCISCO
Pacific Ocean
Sacramento
River
12
4

Figure 57. TEST 7

9/13/76

Auto Traverse:

11 1654 - 1820 PDT, $SF_6(max) = 12$ ppt.

SF_6 released from Pinole from 0600-1500 PDT.

$CBrF_3$ released from the Montezuma Hills from 0900-1100 PDT and from 1300-1400 PDT.

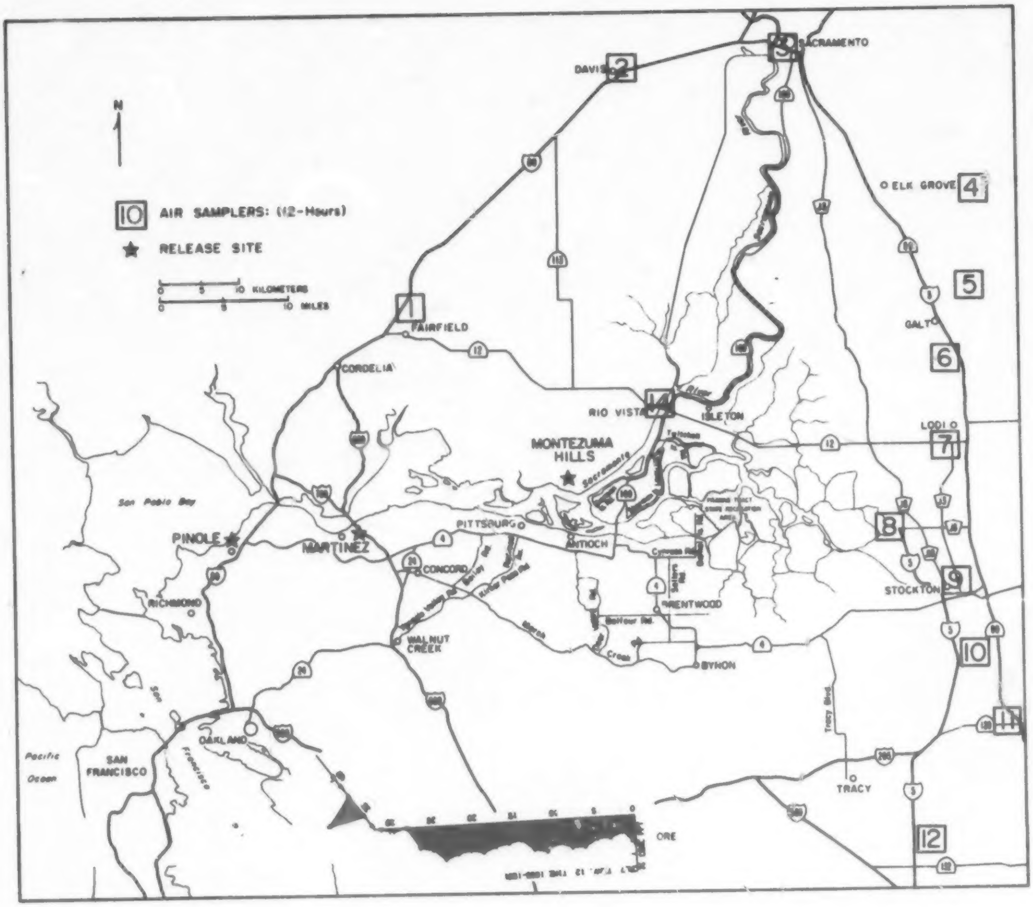

SACRAMENTO
DAVIS
2
3
N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
ELK GROVE
4
5
GALT
6
LODI
7
1
FAIRFIELD
CORDELIA
RIO VISTA
14
ISLETON
MONTEZUMA HILLS
Sacramento
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
Cypress Rd.
BRENTWOOD
Balfour Rd.
8
9
STOCKTON
RICHMOND
WALNUT CREEK
BYRON
10
11
OAKLAND
SAN FRANCISCO
Pacific Ocean
Tracy Blvd.
TRACY
12

Figure 58.

TEST 7

9/13/76

Auto Traverse:

12 1835 - 1901 PDT, SF_6(max) = 13 ppt

SF_6 released from Pinole from 0600-1500 PDT.

$CBrF_3$ released from the Montezuma Hills from 0900-1100 PDT, and from 1300-1400 PDT.

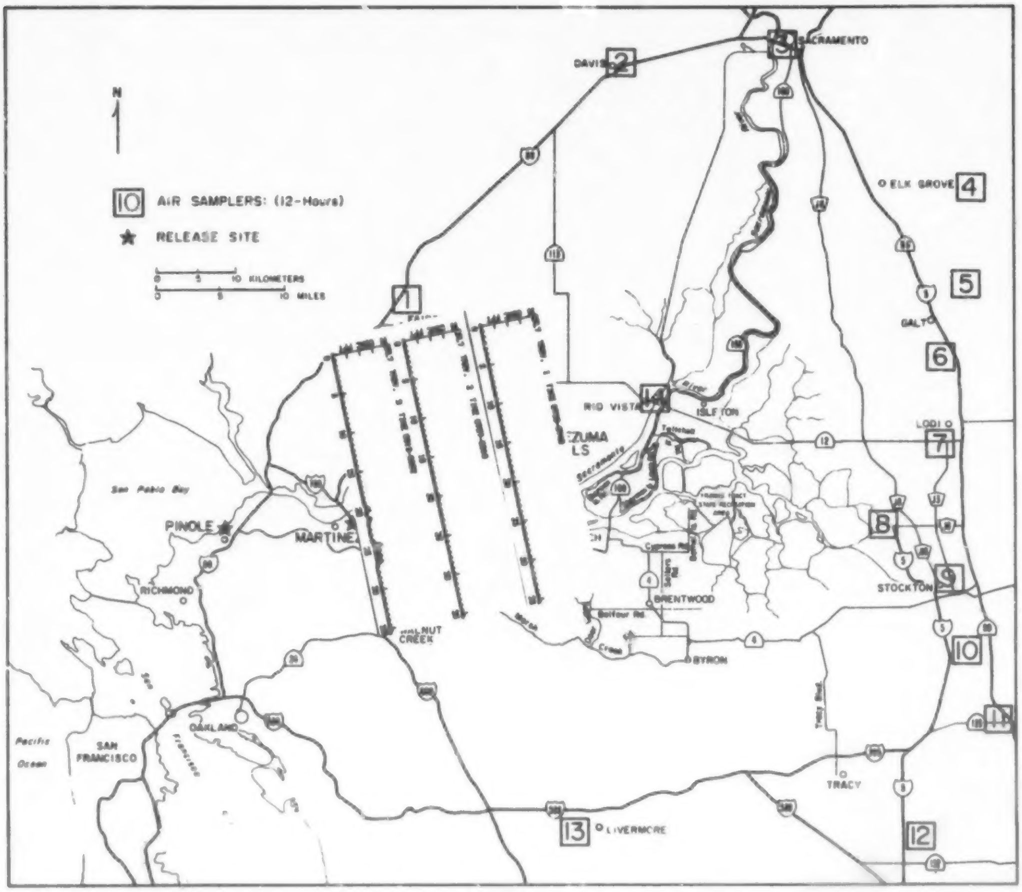

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS 2
3 SACRAMENTO
O ELK GROVE 4
5
GALT
6
LODI
7
8
STOCKTON 9
10
11
12
13 LIVERMORE
TRACY
BYRON
BRENTWOOD
Balfour Rd
Cypress Rd
RIO VISTA 14
ISLETON
12
ZUMA
LS
Sacramento
River
1
San Pablo Bay
PINOLE
MARTINE
RICHMOND
WALNUT CREEK
OAKLAND
SAN FRANCISCO
Pacific Ocean

Figure 59.

TEST 7

9/13/76

Airborne Traverses:

1 0736 - 0748 PDT, 427 m, SF (max) = 0
2 0757 - 0810 PDT, 305 m, SF (max) = 0
3 0819 - 0832 PDT, 183 m, SF (max) = 3

SF_6 released from Pinole from 0600-1500 PDT.

$CBrF_3$ released from the Montezuma Hills from 0900-1100 PDT and from 1300-1400 PDT.

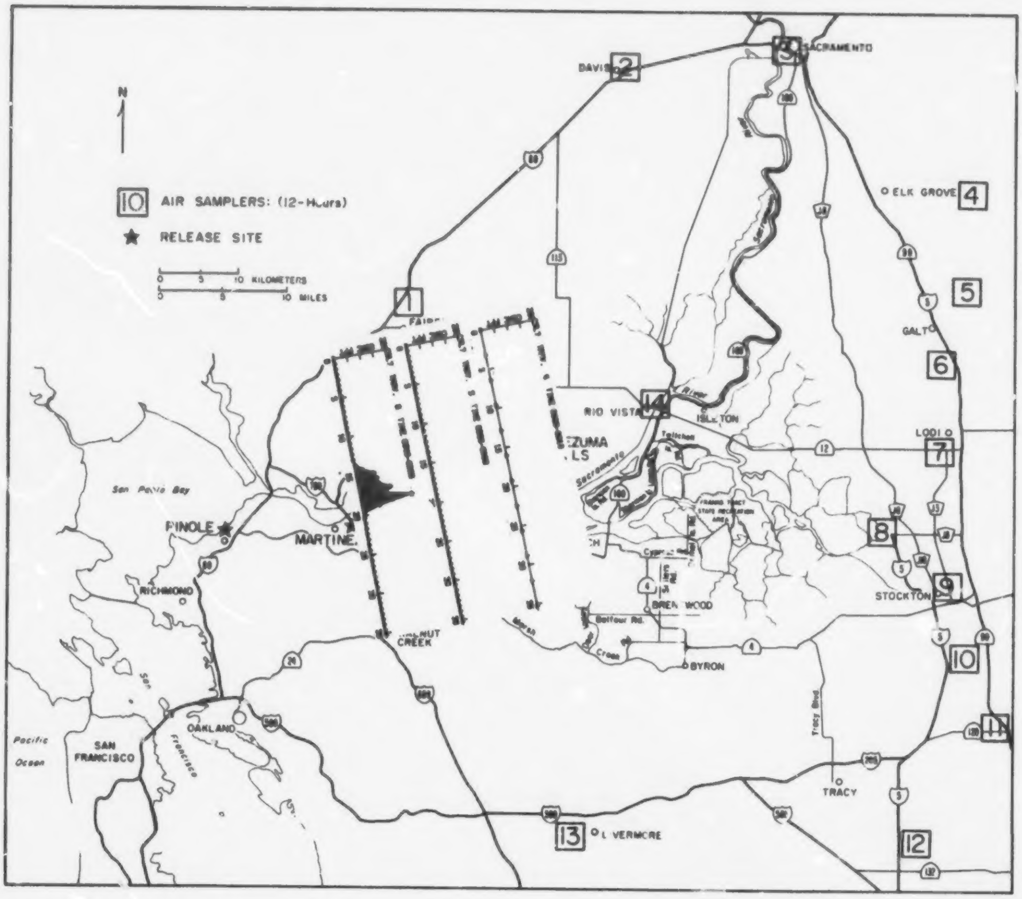

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS 2
3 SACRAMENTO
ELK GROVE 4
5
GALT
6
LODI
7
8
STOCKTON
9
10
11
12
13 L VERMORE
TRACY
1
RIO VISTA
14
ISLETON
ZUMA
LS
Sacramento
BRENTWOOD
Balfour Rd.
BYRON
Tracy Blvd
PINOLE
MARTINEZ
RICHMOND
WALNUT CREEK
OAKLAND
SAN FRANCISCO
Pacific Ocean
San Pablo Bay
San Francisco

Figure 60.

TEST 7

9/13/76

Airborne Traverses:

4 0906 - 0918 PDT, 427 m, SF_6(max) = 00 ppt
5 0925 - 0938 PDT, 305 m, SF_6(max) = 1 ppt
6 0945 - 0958 PDT, 183 m, SF_6(max) = 199 ppt

SF_6 released from Pinole from 0600-1500 PDT.

$CBrF_3$ released from the Montezuma Hills from 0900-1100 PDT and from 1300-1400 PDT.

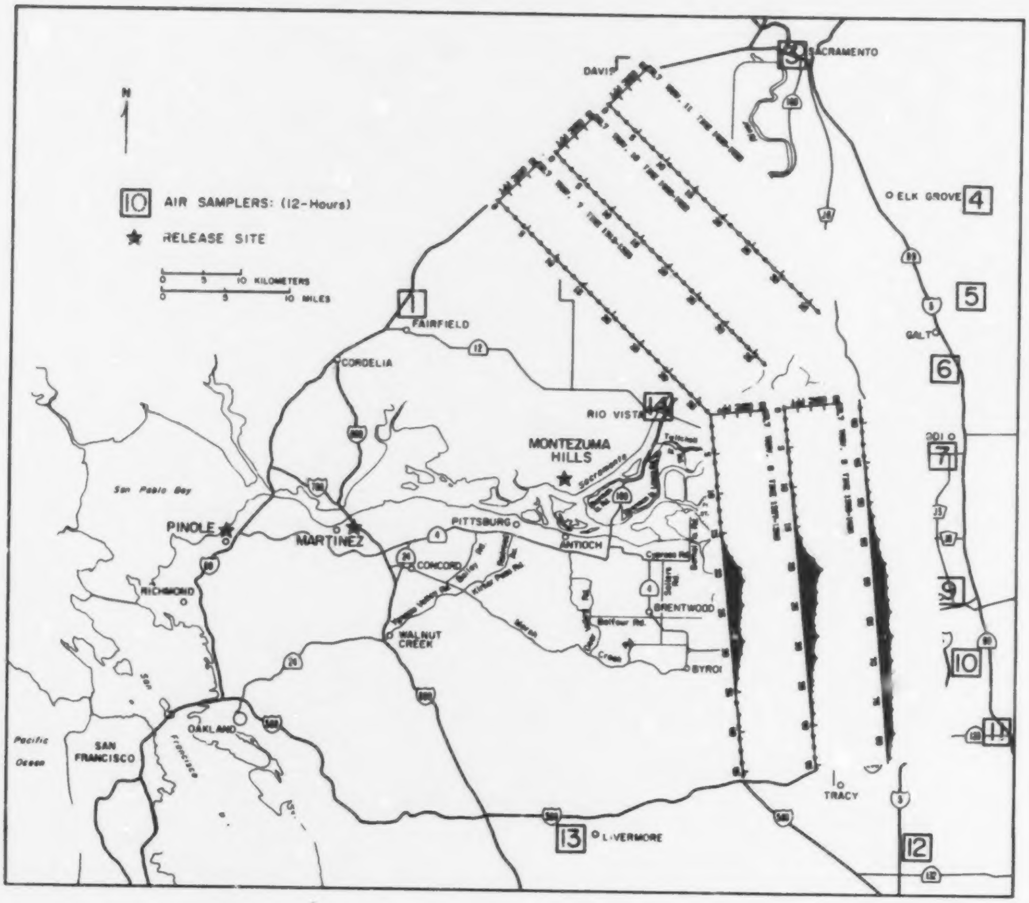

N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS
SACRAMENTO
ELK GROVE
4
5
GALT
6
7
9
10
11
12
TRACY
13
LIVERMORE
14
RIO VISTA
MONTEZUMA HILLS
1
FAIRFIELD
CORDELIA
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
BYRON
OAKLAND
SAN FRANCISCO
Pacific Ocean
Sacramento

Figure 61.

TEST 7

9/13/76

Airborne Traverses:

7 1312-1324 PDT, 183 m, SF_6(max) = 0 ppt.
8 1327-1343 PDT, 183 m, SF_6(max) = 10 ppt.
9 1348-1408 PDT, 305 m, SF_6(max) = 25 ppt.
10 1409-1422 PDT, 305 m, SF_6(max) = 1 ppt.
11 1428-1456 PDT, 427 m, SF_6(max) = 15 ppt.

SF_6 released from Pinole from 0600-1500 PDT.

$CBrF_3$ released from the Montezuma Hills from 0900-1100 PDT and from 1300-1400 PDT.

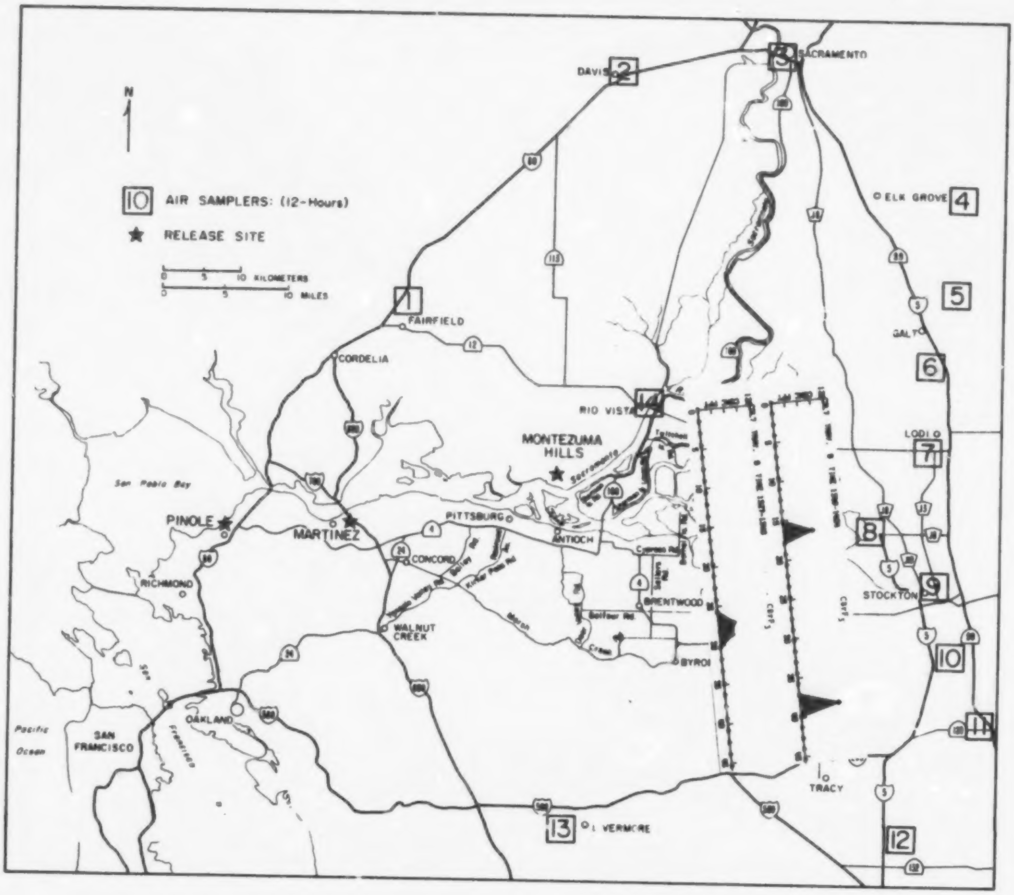

N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS 2
3 SACRAMENTO
ELK GROVE 4
5
GALT
6
LODI
7
8
STOCKTON
9
10
11
TRACY
12
13 LIVERMORE
14 RIO VISTA
1 FAIRFIELD
CORDELIA
MONTEZUMA HILLS
PITTSBURG
ANTIOCH
BRENTWOOD
BYRON
CONCORD
WALNUT CREEK
PINOLE
MARTINEZ
RICHMOND
OAKLAND
SAN FRANCISCO
San Pablo Bay
Pacific Ocean
CBrF3
CBrF3

Figure 62.

TEST 7
9/13/76

Air Traverses:

8 1327-1343, 183 m, $CBrF_3$(max) = 19 ppt.

9 1348-1404, 305 m, $CBrF_3$(max) = 25 ppt.

SF_6 released from Pinole from 0600-1500 PDT.

$CBrF_3$ released from the Montezuma Hills from 0900-1100 PDT and from 1300-1400 PDT.

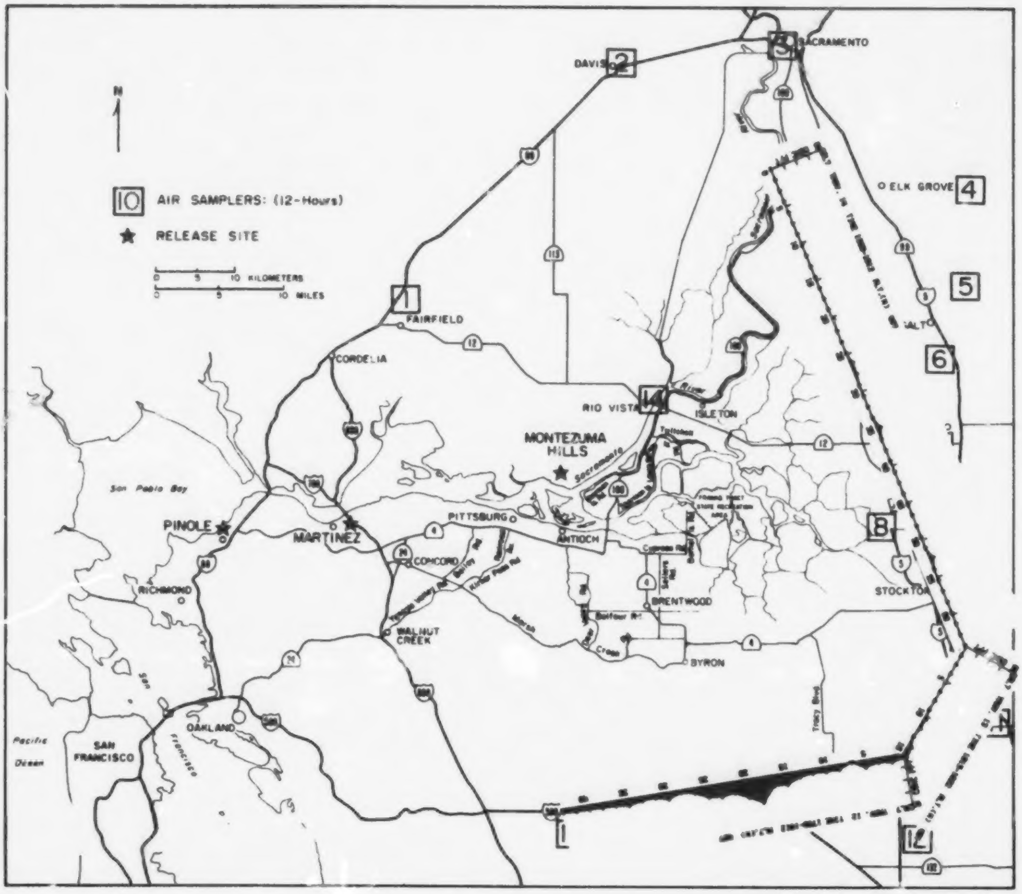

N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS
2
3
SACRAMENTO
ELK GROVE
4
5
GALT
6
1
FAIRFIELD
CORDELIA
14
RIO VISTA
ISLETON
MONTEZUMA HILLS
Sacramento
River
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
RICHMOND
WALNUT CREEK
BRENTWOOD
Balfour Rd
Marsh
Creek
BYRON
8
STOCKTON
Tracy Blvd
OAKLAND
San
Francisco
Pacific Ocean
SAN FRANCISCO
I
12
13

Figure 63.

TEST 7

9/13/76

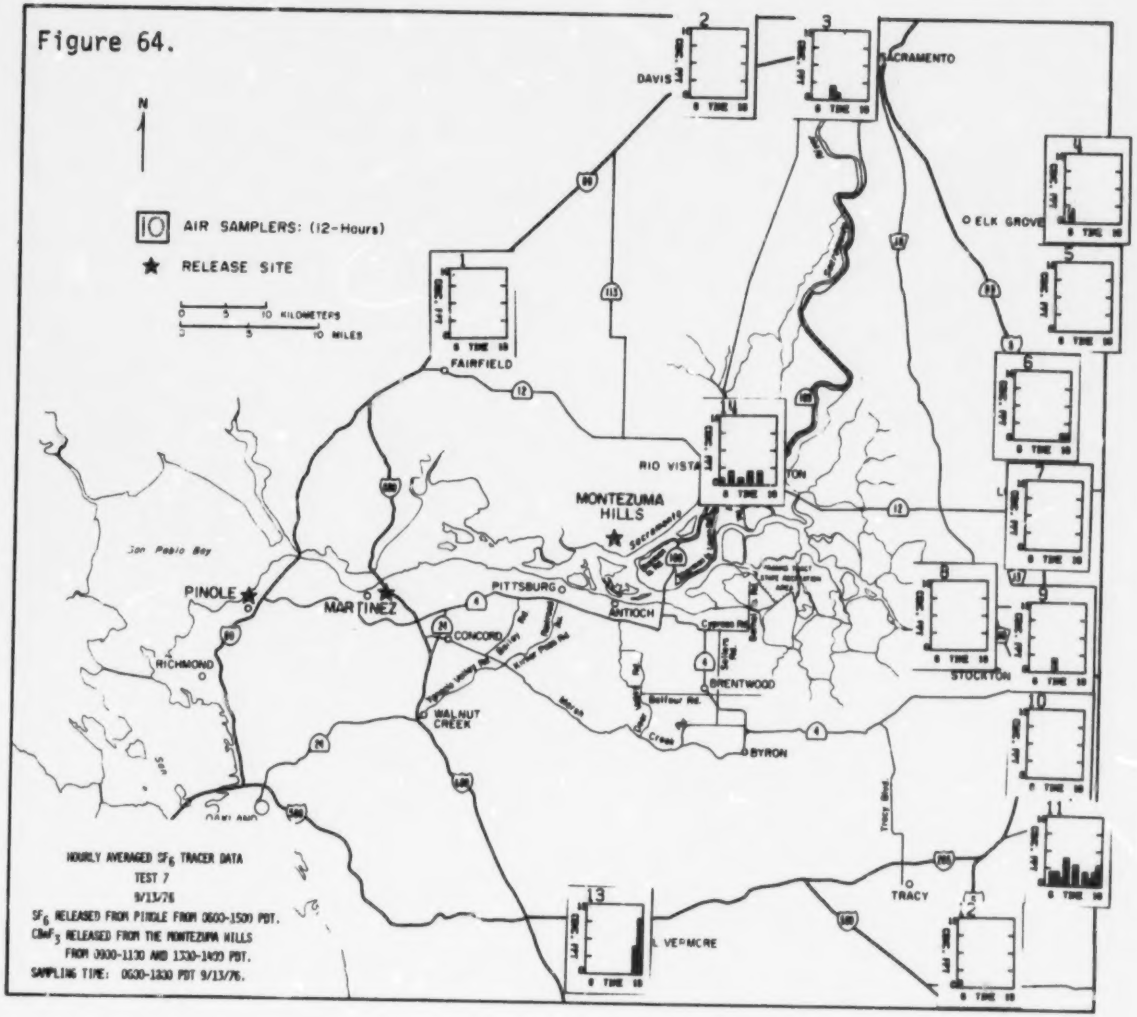
Airborne Traverses:

12	1759 - 1812 PDT,	457 m,	SF_6(max) =	29 ppt
13	1815 - 1822 PDT,	457 m,	SF_6(max) =	5 ppt
14	1850 - 1912 PDT,	457 m,	SF_6(max) =	4 ppt

SF_6 released from Pinole from 0600-1500 PDT.

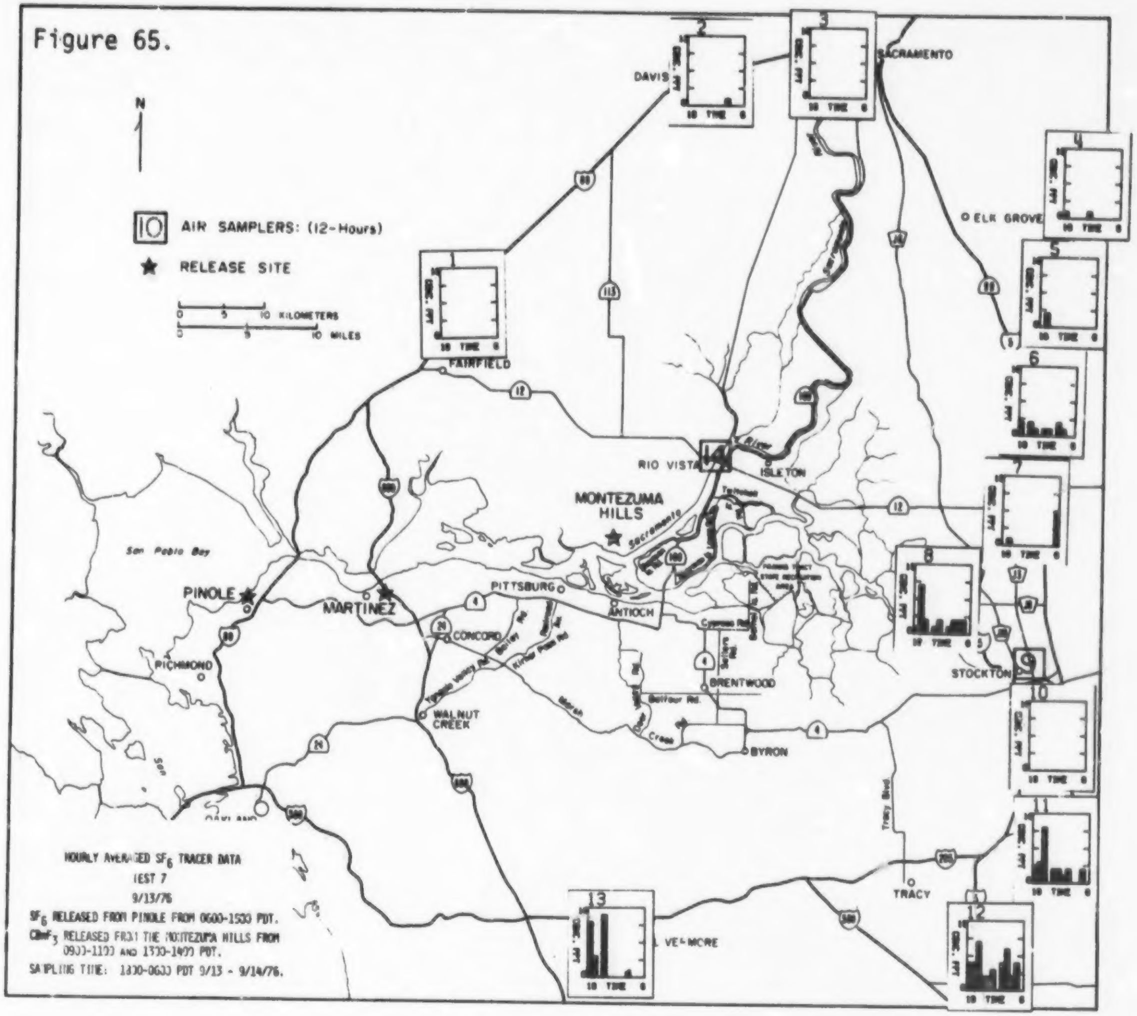
$CBrF_3$ released from the Montezuma Hills from 0900-1100 PDT and from 1300-1400 PDT.

Figure 64.


N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
1
2
3
4
5
6
7
8
9
10
11
12
13
CONC. PPT
0 TIME 10
DAVIS
SACRAMENTO
ELK GROVE
FAIRFIELD
RIO VISTA
MONTEZUMA HILLS
Sacramento
PITTSBURG
ANTIOCH
STOCKTON
BRENTWOOD
BYRON
TRACY
LIVERMORE
CONCORD
WALNUT CREEK
MARTINEZ
PINOLE
RICHMOND
OAKLAND
San Pablo Bay
San
Balfour Rd.
Cypress Rd.
Marsh Creek
Tracy Blvd
80
113
12
4
24
680
580
205
5
99
160

HOURLY AVERAGED SF_6 TRACER DATA
TEST 7
9/13/76
SF_6 RELEASED FROM PINOLE FROM 0600-1500 PDT.
$CBrF_3$ RELEASED FROM THE MONTEZUMA HILLS
FROM 0900-1130 AND 1330-1400 PDT.
SAMPLING TIME: 0630-1830 PDT 9/13/76.

Figure 65.


N
AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS
SACRAMENTO
ELK GROVE
FAIRFIELD
RIO VISTA
ISLETON
MONTEZUMA HILLS
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
CONCORD
BRENTWOOD
WALNUT CREEK
BYRON
STOCKTON
TRACY
PICHMOND
LIVERMORE
CONC. PPT
10 TIME 0
1
2
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6
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8
9
10
11
12
13
14

HOURLY AVERAGED SF_6 TRACER DATA

TEST 7

9/13/76

SF_6 RELEASED FROM PINOLE FROM 0600-1500 PDT.

$CBrF_3$ RELEASED FROM THE MONTEZUMA HILLS FROM 0900-1100 AND 1300-1400 PDT.

SAMPLING TIME: 1800-0600 PDT 9/13 - 9/14/76.

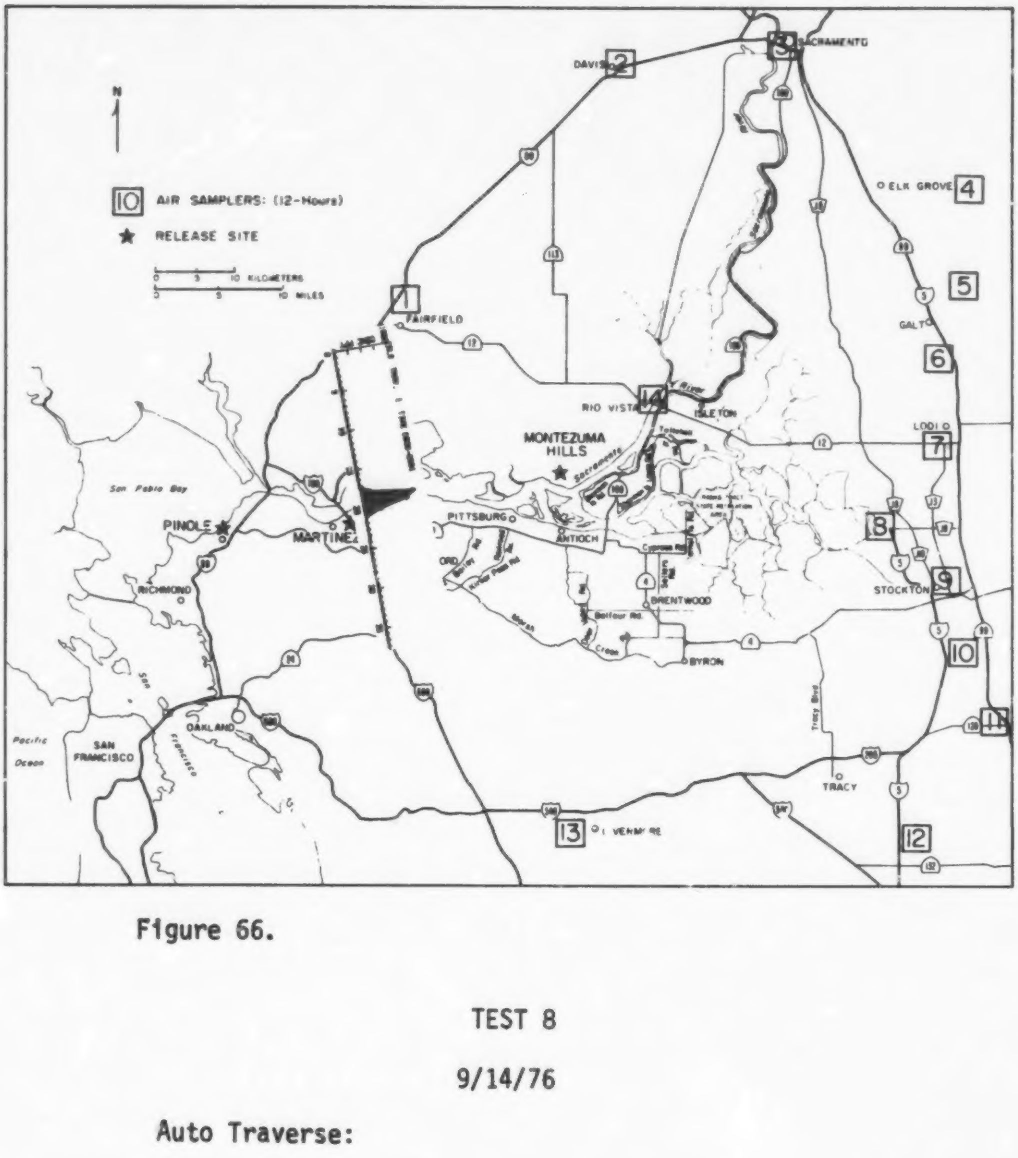

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS 2
3 SACRAMENTO
ELK GROVE 4
5
GALT
6
LODI
7
8
STOCKTON 9
10
11
TRACY
12
13 LIVERMORE
1 FAIRFIELD
RIO VISTA 14
ISLETON
MONTEZUMA HILLS
Sacramento River
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
ANTIOCH
RICHMOND
BRENTWOOD
BYRON
OAKLAND
SAN FRANCISCO
Pacific Ocean
San Francisco Bay

Figure 66.

TEST 8

9/14/76

Auto Traverse:

1 0906 - 0931 PDT, SF_6(max) = 1598 ppt

SF_6 released from Pinole from 0730-1300 PDT.

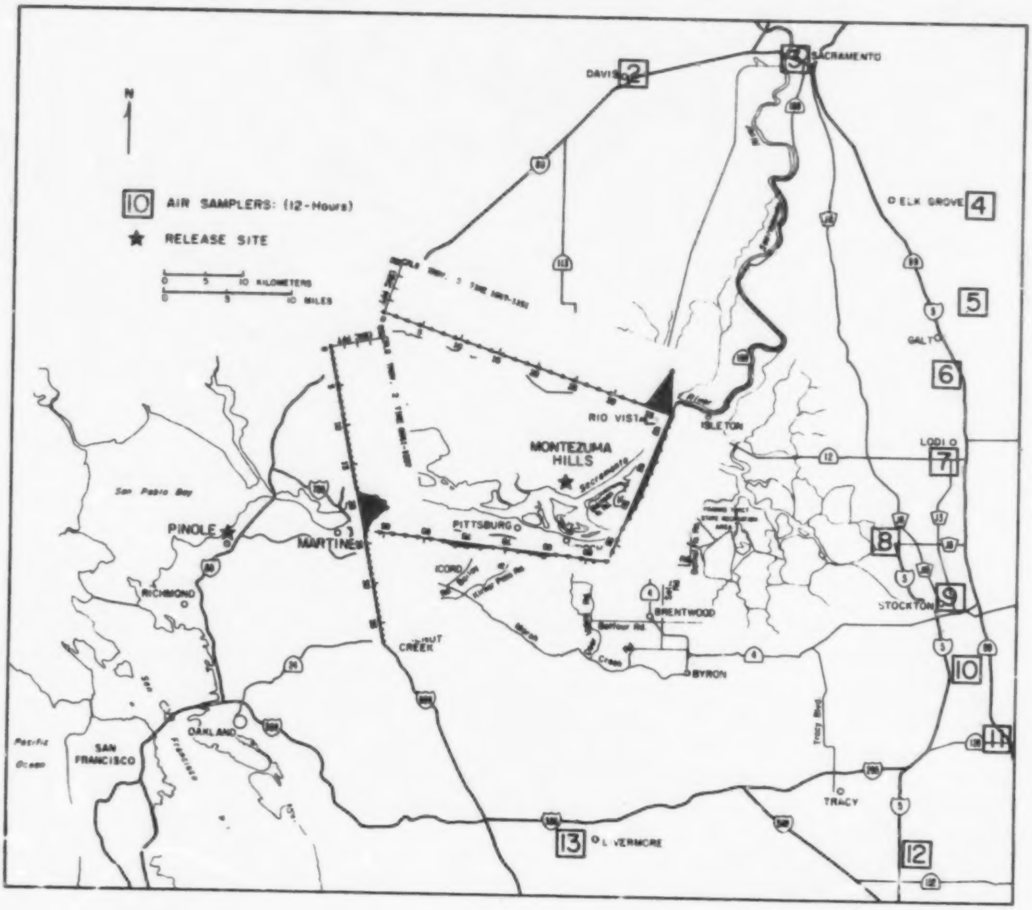

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS 2
3 SACRAMENTO
ELK GROVE 4
5
GALT
6
RIO VISTA
ISLETON
MONTEZUMA HILLS
LODI
7
San Pablo Bay
PINOLE
MARTINEZ
PITTSBURG
8
STOCKTON 9
RICHMOND
BRENTWOOD
WALNUT CREEK
BYRON
10
11
Pacific Ocean
SAN FRANCISCO
OAKLAND
TRACY
13 LIVERMORE
12

Figure 67.

TEST 8

9/14/76

Auto Traverses:

2 0941 - 1007 PDT, SF (max) = 412 ppt

3 1047 - 1151 PDT, SF (max) = 78 ppt

SF_6 released from Pinole from 0730-1300 PDT.

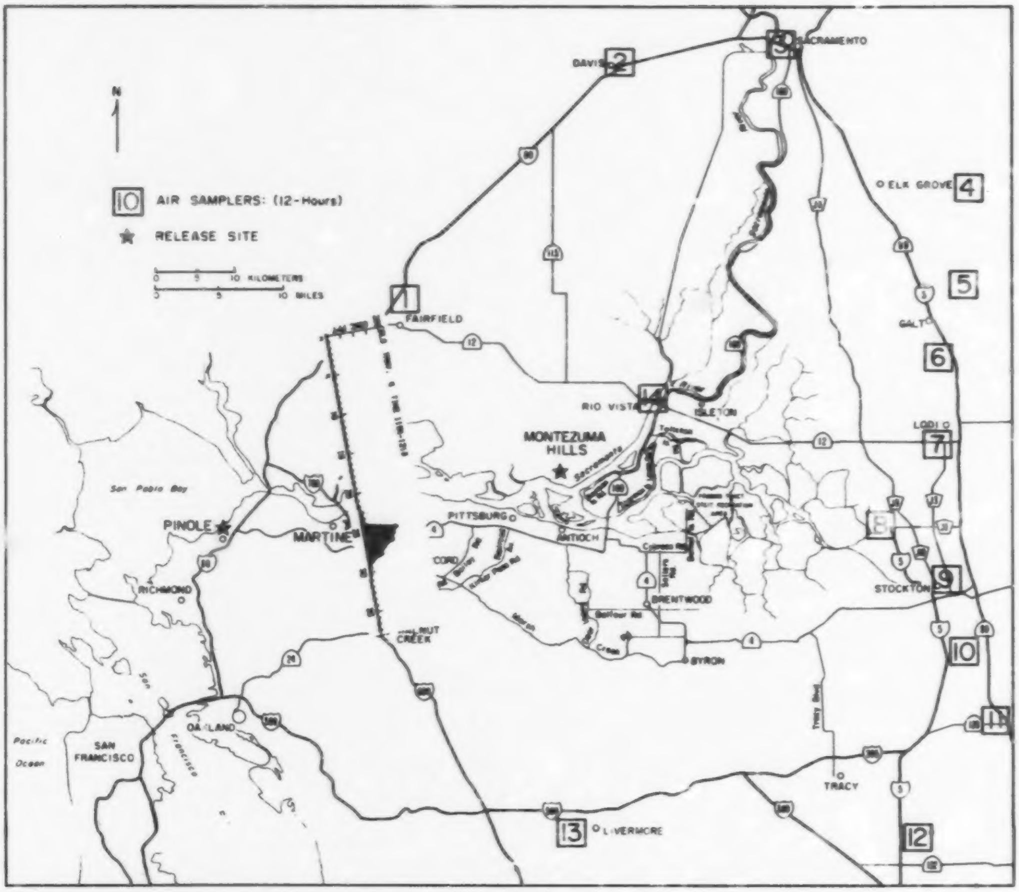

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
1
2
3
4
5
6
7
8
9
10
11
12
13
14
DAVIS
SACRAMENTO
ELK GROVE
GALT
LODI
STOCKTON
TRACY
LIVERMORE
FAIRFIELD
RIO VISTA
ISLETON
MONTEZUMA HILLS
Sacramento
River
PITTSBURG
ANTIOCH
BRENTWOOD
Balfour Rd
BYRON
Creek
CORD
MARTINEZ
PINOLE
San Pablo Bay
RICHMOND
WALNUT CREEK
OAKLAND
SAN FRANCISCO
San Francisco
Pacific Ocean
Tracy Blvd

Figure 68.

TEST 8

9/14/76

Auto Traverse:

4 1154 - 1218 PDT, SF (max) = 129 ppt

SF_6 released from Pinole from 0730-1300 PDT.

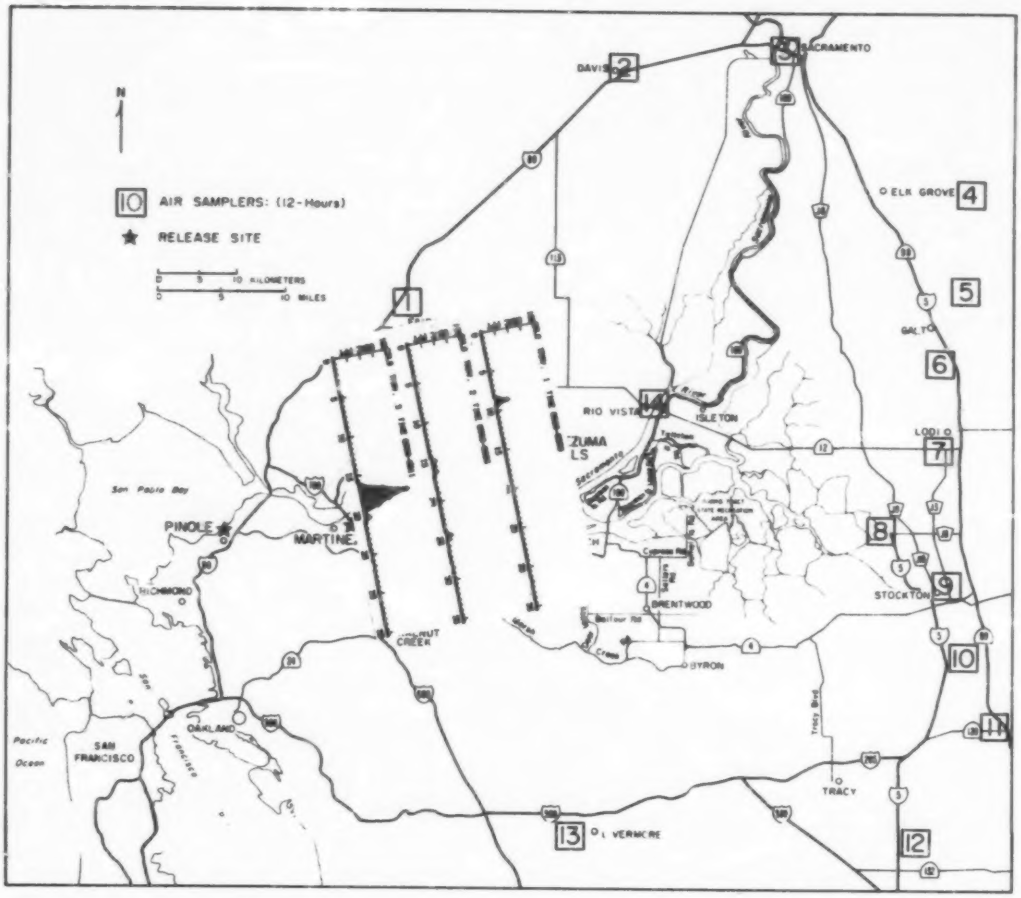

N
10 AIR SAMPLERS: (12-Hours)
★ RELEASE SITE
0 5 10 KILOMETERS
0 5 10 MILES
DAVIS
SACRAMENTO
ELK GROVE
GALT
LODI
STOCKTON
RIO VISTA
ISLETON
BRENTWOOD
BYRON
TRACY
VERMORE
WALNUT CREEK
MARTINEZ
PINOLE
RICHMOND
OAKLAND
SAN FRANCISCO
San Pablo Bay
Pacific Ocean
1
2
3
4
5
6
7
8
9
10
11
12
13
14

Figure 69.

TEST 8

9/14/76

Airborne Traverses:

1 0826 - 0839 PDT, 366 m, SF_6(max) = 39 ppt
2 0843 - 0856 PDT, 274 m, SF_6(max) = 15 ppt
3 0858 - 0911 PDT, 183 m, SF_6(max) = 145 ppt

SF_6 released from Pinole from 0730-1300 PDT.

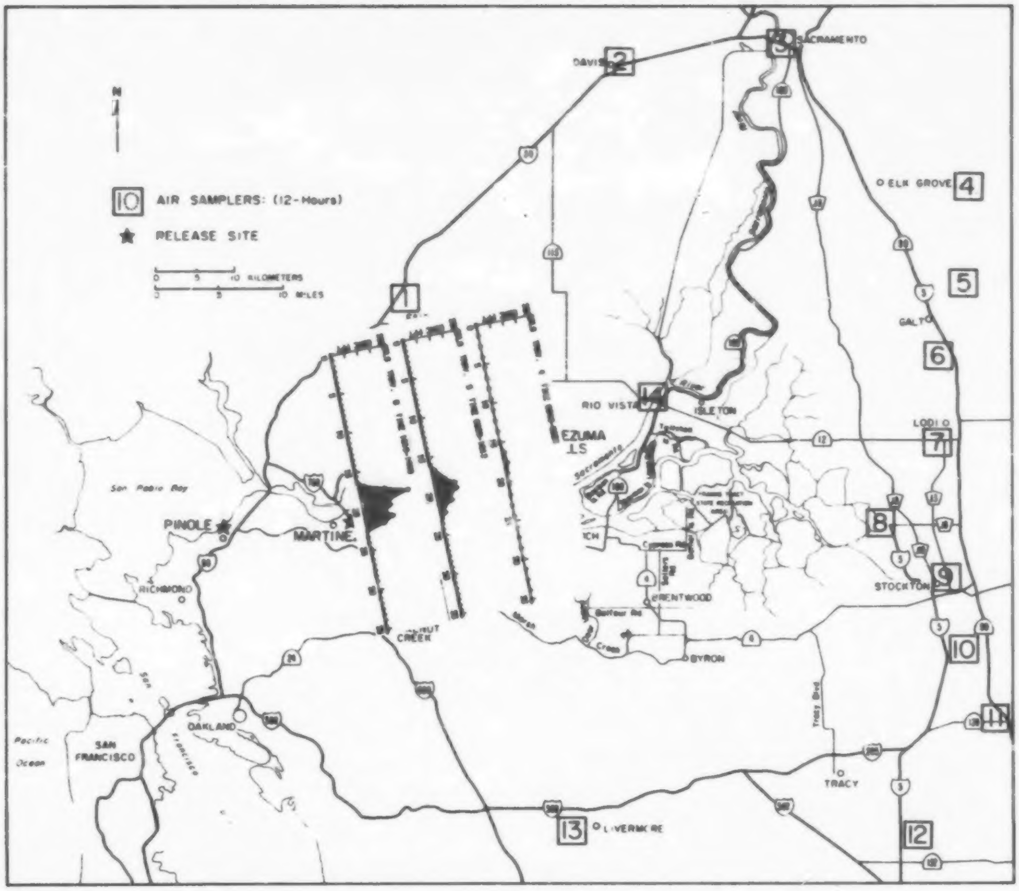

N
10 AIR SAMPLERS: (12-Hours)
RELEASE SITE
KILOMETERS
MILES
DAVIS
2
3
SACRAMENTO
ELK GROVE
4
5
GALT
6
LODI
7
8
STOCKTON
9
10
11
12
TRACY
13
LIVERMORE
1
14
RIO VISTA
ISLETON
San Pablo Bay
PINOLE
MARTINEZ
RICHMOND
WALNUT CREEK
BRENTWOOD
BYRON
OAKLAND
SAN FRANCISCO
Pacific Ocean

Figure 70.

TEST 8

9/14/76

Airborne Traverses:

4 0942-0955 PDT, 427 m, SF_6(max) = 22 ppt.

5 0959-1012 PDT, 305 m, SF_6(max) = 134 ppt.

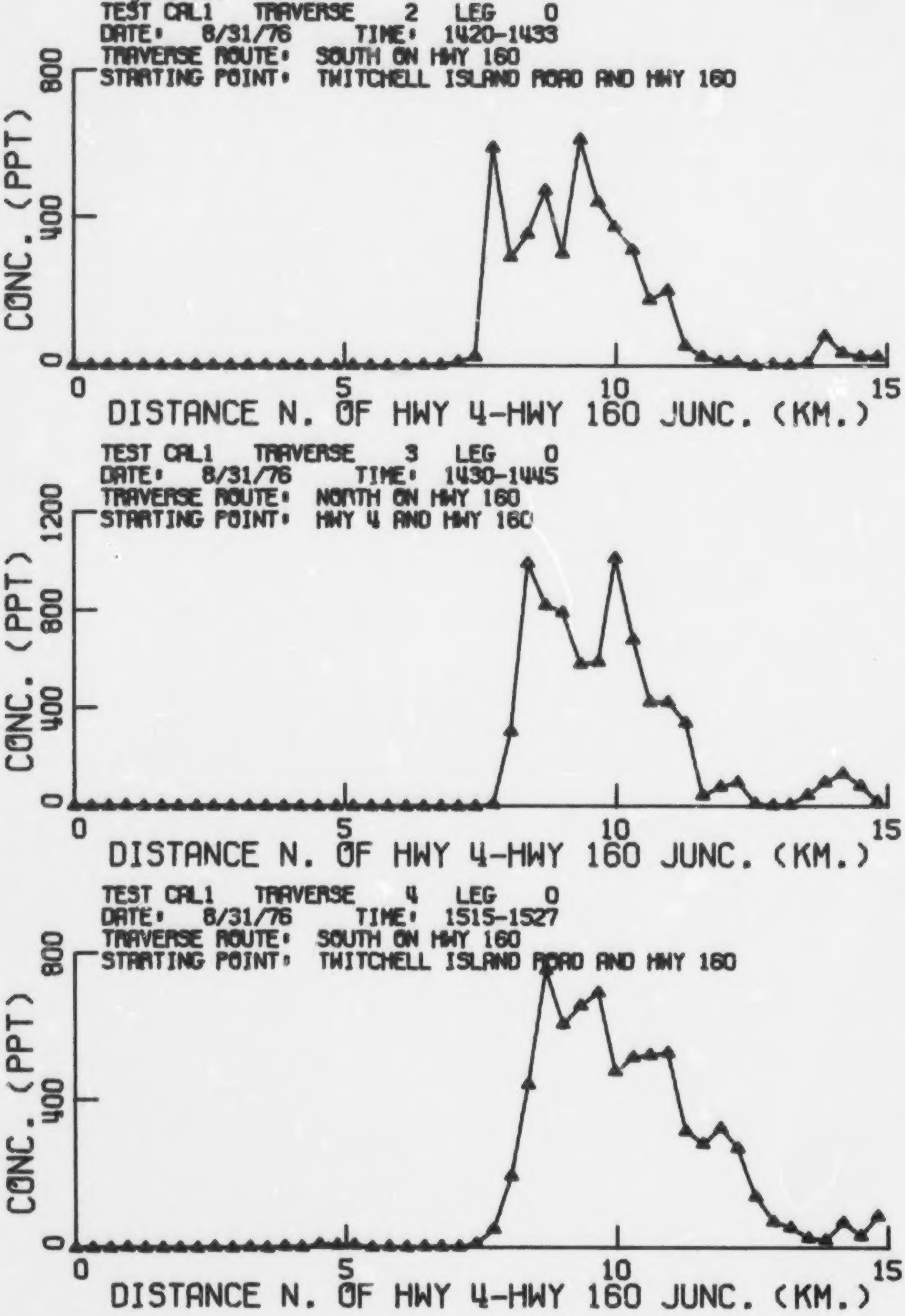
6 1016-1028 PDT, 183 m, SF_6(max) = 304 ppt.

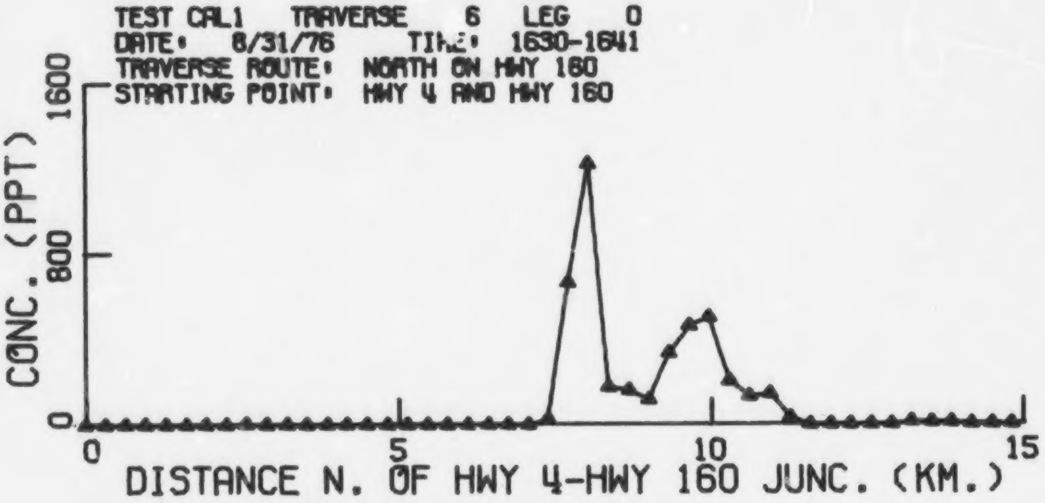
SF_6 released from Pinole from 0730-1300 PDT.

3.3 Automobile Traverse Tracer Data

The automobile traverse tracer data are plotted in the following figures as concentration versus distance along the traverse. The data from traverses along Highway 160 are plotted as a function of the distance north of the intersection of Highway 4 and Highway 160. Traverses with maximum concentrations less than 10 ppt are not plotted.

Figure 71.


TEST CAL1 TRAVERSE 2 LEG 0
DATE: 8/31/76 TIME: 1420-1433
TRAVERSE ROUTE: SOUTH ON HWY 160
STARTING POINT: TWITCHELL ISLAND ROAD AND HWY 160
CONC. (PPT)
0
400
800
0
5
10
15
DISTANCE N. OF HWY 4-HWY 160 JUNC. (KM.)
TEST CAL1 TRAVERSE 3 LEG 0
DATE: 8/31/76 TIME: 1430-1445
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: HWY 4 AND HWY 160
CONC. (PPT)
0
400
800
1200
0
5
10
15
DISTANCE N. OF HWY 4-HWY 160 JUNC. (KM.)
TEST CAL1 TRAVERSE 4 LEG 0
DATE: 8/31/76 TIME: 1515-1527
TRAVERSE ROUTE: SOUTH ON HWY 160
STARTING POINT: TWITCHELL ISLAND ROAD AND HWY 160
CONC. (PPT)
0
400
800
0
5
10
15
DISTANCE N. OF HWY 4-HWY 160 JUNC. (KM.)


TEST CAL1 TRAVERSE 6 LEG 0
DATE: 8/31/76 TIME: 1630-1641
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: HWY 4 AND HWY 160
CONC. (PPT)
1600
800
0
0
5
10
15
DISTANCE N. OF HWY 4-HWY 160 JUNC. (KM.)

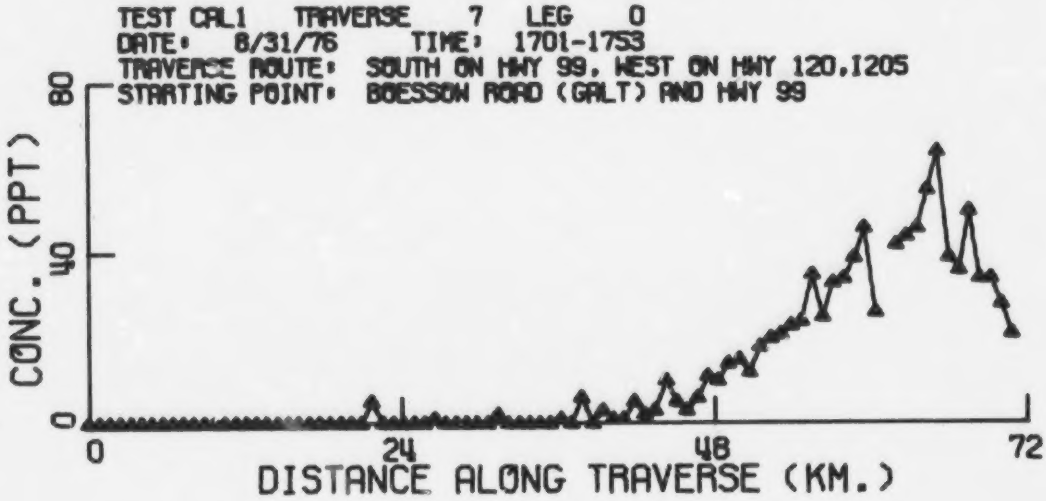
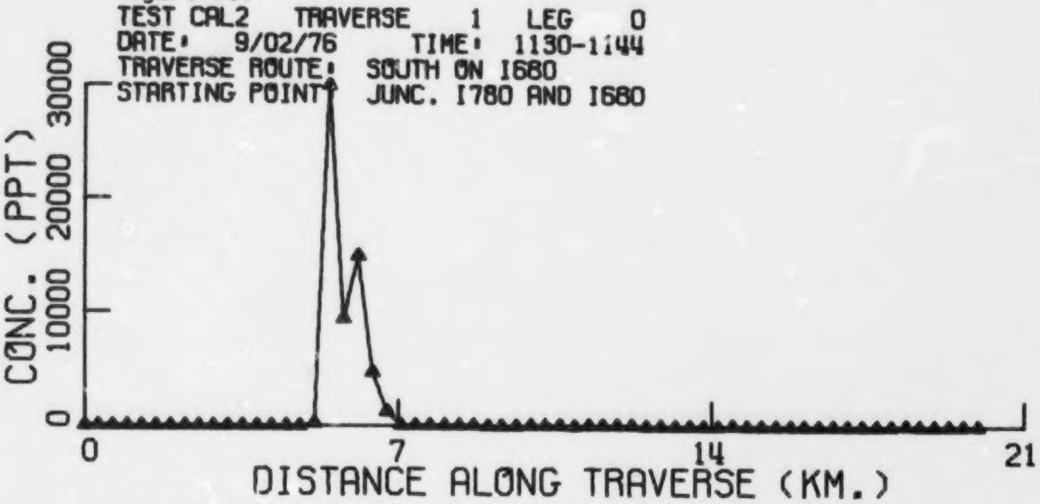
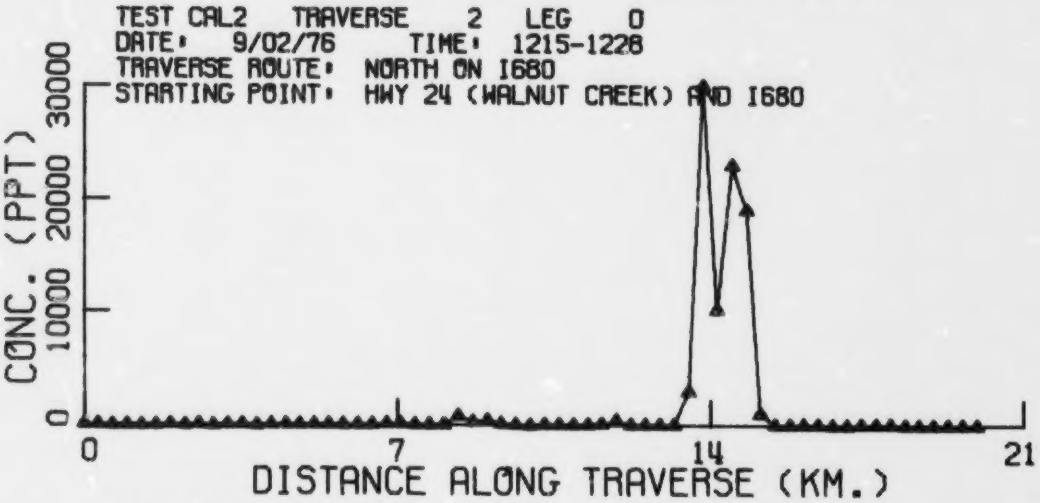

TEST CAL1 TRAVERSE 7 LEG 0
DATE: 8/31/76 TIME: 1701-1753
TRAVERSE ROUTE: SOUTH ON HWY 99, WEST ON HWY 120,I205
STARTING POINT: BOESSON ROAD (GALT) AND HWY 99
CONC. (PPT)
80
40
0
0
24
48
72
DISTANCE ALONG TRAVERSE (KM.)

Figure 72.

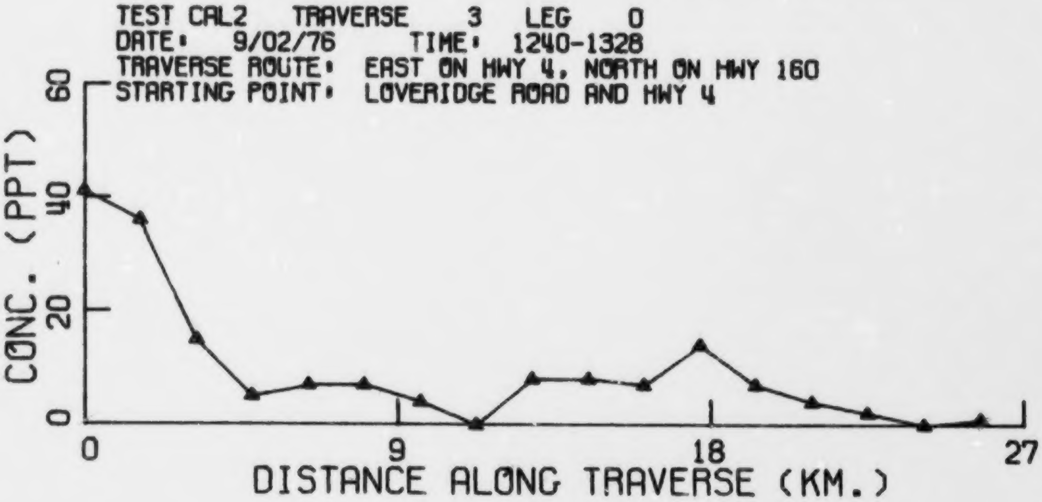
Figure 73.



TEST CAL2 TRAVERSE 1 LEG 0
DATE: 9/02/76 TIME: 1130-1144
TRAVERSE ROUTE: SOUTH ON I680
STARTING POINT: JUNC. I780 AND I680



TEST CAL2 TRAVERSE 2 LEG 0
DATE: 9/02/76 TIME: 1215-1228
TRAVERSE ROUTE: NORTH ON I680
STARTING POINT: HWY 24 (WALNUT CREEK) AND I680



TEST CAL2 TRAVERSE 3 LEG 0
DATE: 9/02/76 TIME: 1240-1328
TRAVERSE ROUTE: EAST ON HWY 4, NORTH ON HWY 160
STARTING POINT: LOVERIDGE ROAD AND HWY 4

Figure 74.

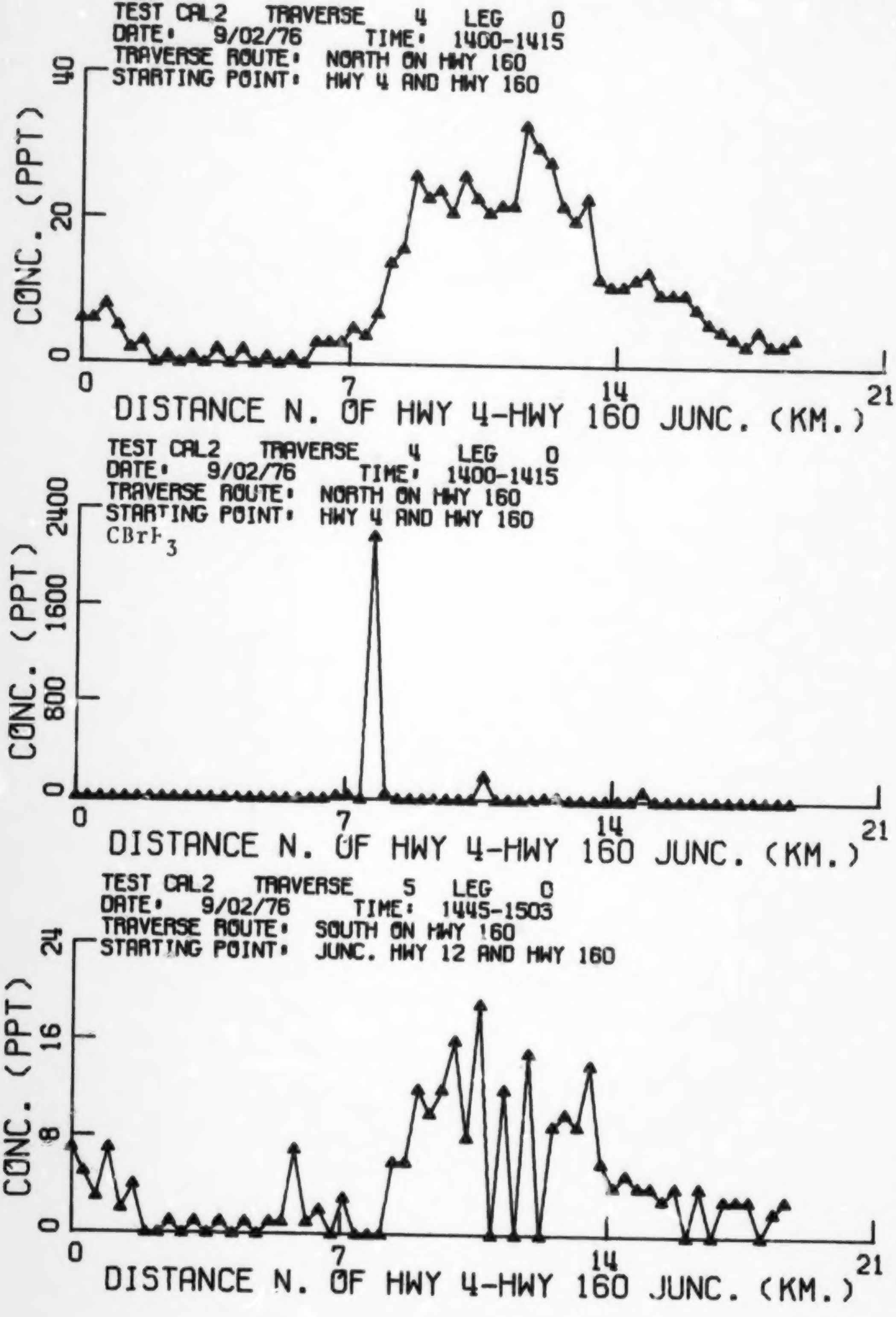
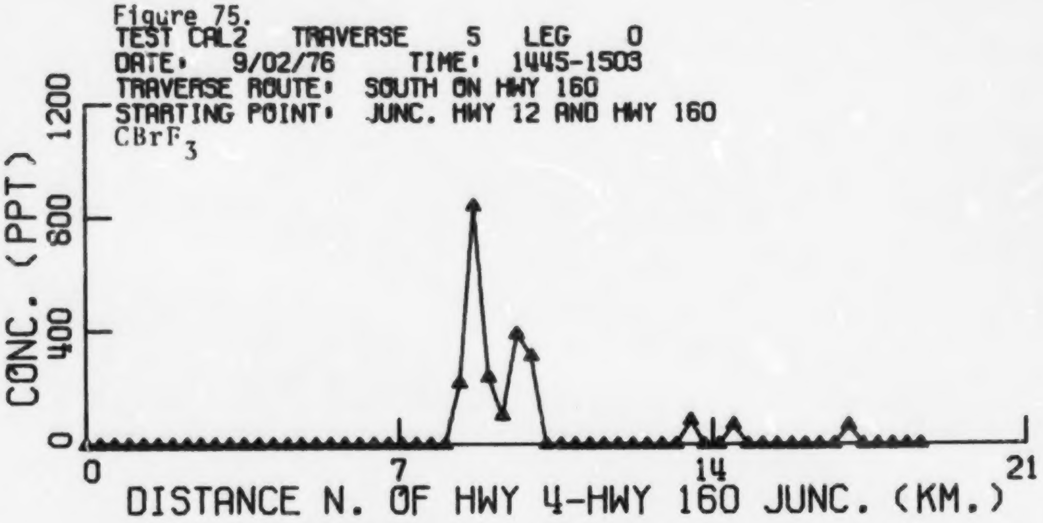
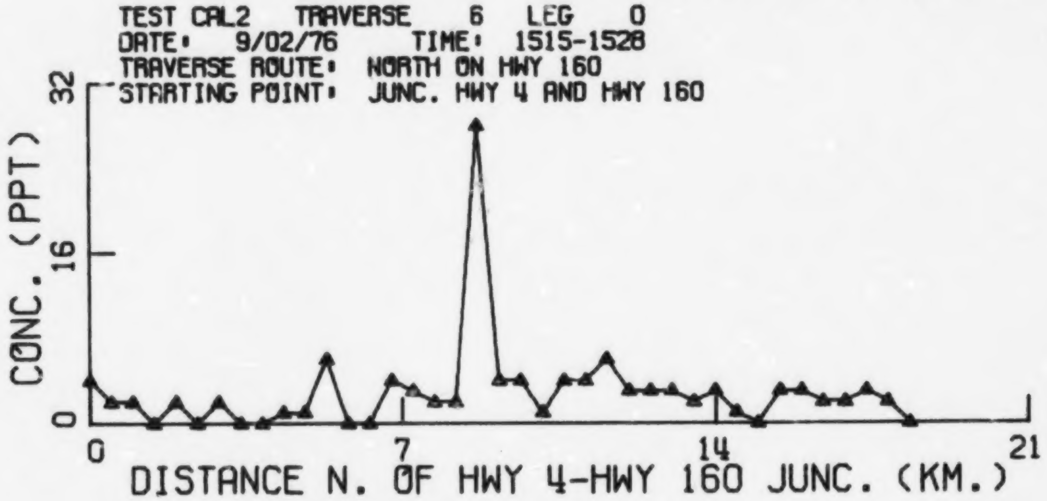

TEST CAL2 TRAVERSE 4 LEG 0
DATE: 9/02/76 TIME: 1400-1415
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: HWY 4 AND HWY 160
CONC. (PPT)
0
20
40
0
7
14
21
DISTANCE N. OF HWY 4-HWY 160 JUNC. (KM.)
TEST CAL2 TRAVERSE 4 LEG 0
DATE: 9/02/76 TIME: 1400-1415
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: HWY 4 AND HWY 160
CBrF3
CONC. (PPT)
0
800
1600
2400
0
7
14
21
DISTANCE N. OF HWY 4-HWY 160 JUNC. (KM.)
TEST CAL2 TRAVERSE 5 LEG 0
DATE: 9/02/76 TIME: 1445-1503
TRAVERSE ROUTE: SOUTH ON HWY 160
STARTING POINT: JUNC. HWY 12 AND HWY 160
CONC. (PPT)
0
8
16
24
0
7
14
21
DISTANCE N. OF HWY 4-HWY 160 JUNC. (KM.)

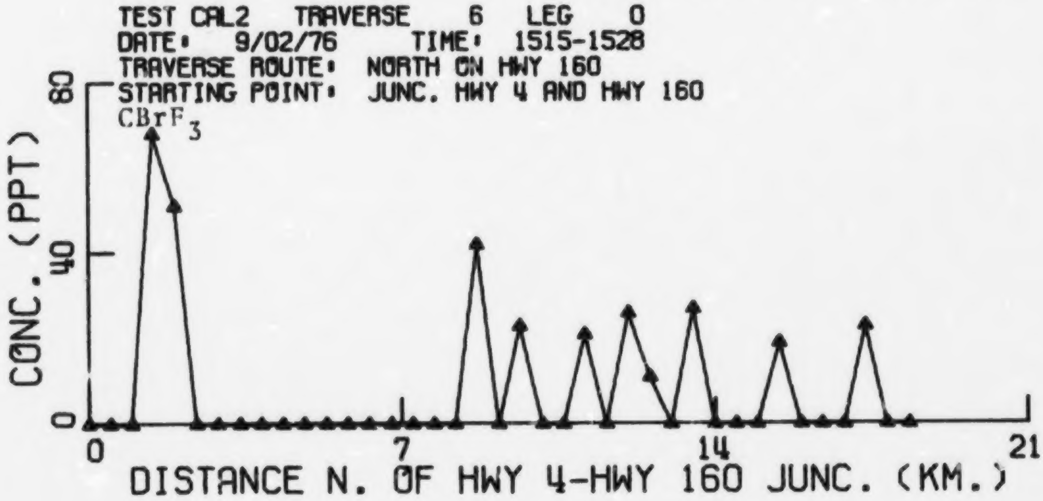
Figure 75.



TEST CAL2 TRAVERSE 5 LEG 0
DATE: 9/02/76 TIME: 1445-1503
TRAVERSE ROUTE: SOUTH ON HWY 160
STARTING POINT: JUNC. HWY 12 AND HWY 160

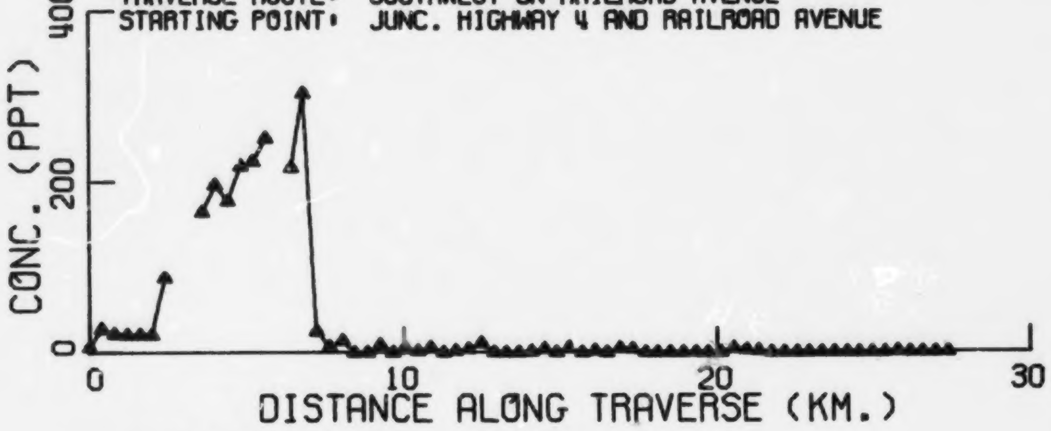


TEST CAL2 TRAVERSE 6 LEG 0
DATE: 9/02/76 TIME: 1515-1528
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: JUNC. HWY 4 AND HWY 160

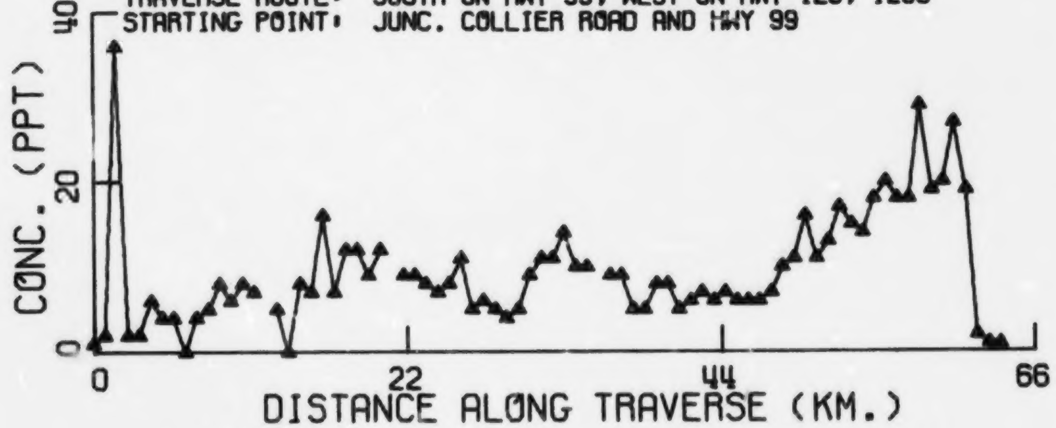


TEST CAL2 TRAVERSE 6 LEG 0
DATE: 9/02/76 TIME: 1515-1528
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: JUNC. HWY 4 AND HWY 160

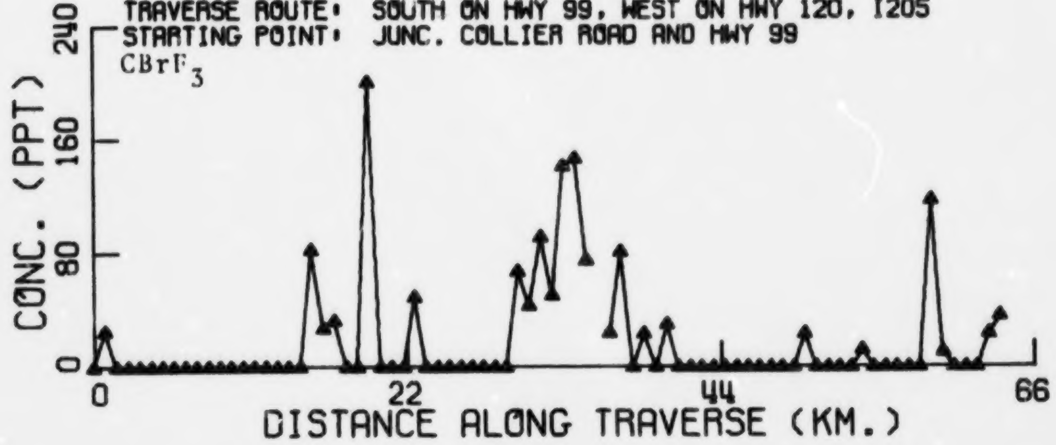
Figure 76.



TEST CAL2 TRAVERSE 7 LEG 0
DATE: 9/02/76 TIME: 1545-1635
TRAVERSE ROUTE: SOUTHWEST ON RAILROAD AVENUE
STARTING POINT: JUNC. HIGHWAY 4 AND RAILROAD AVENUE



TEST CAL2 TRAVERSE 9 LEG 0
DATE: 9/02/76 TIME: 1630-1715
TRAVERSE ROUTE: SOUTH ON HWY 99, WEST ON HWY 120, I205
STARTING POINT: JUNC. COLLIER ROAD AND HWY 99



TEST CAL2 TRAVERSE 9 LEG 0
DATE: 9/02/76 TIME: 1630-1715
TRAVERSE ROUTE: SOUTH ON HWY 99, WEST ON HWY 120, I205
STARTING POINT: JUNC. COLLIER ROAD AND HWY 99

Figure 77.

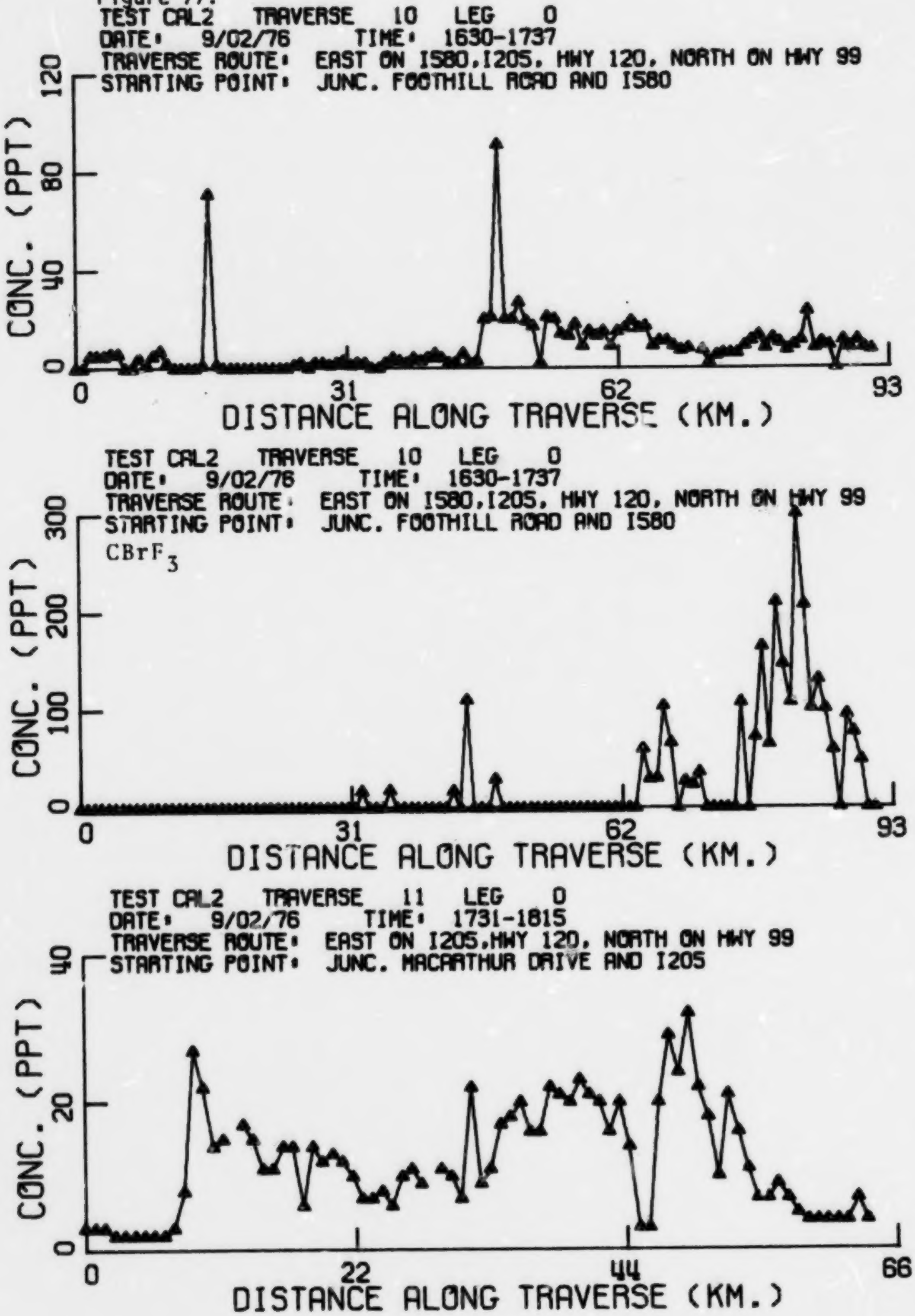

TEST CAL2 TRAVERSE 10 LEG 0
DATE: 9/02/76 TIME: 1630-1737
TRAVERSE ROUTE: EAST ON I580, I205, HWY 120, NORTH ON HWY 99
STARTING POINT: JUNC. FOOTHILL ROAD AND I580
CONC. (PPT)
0
40
80
120
0
31
62
93
DISTANCE ALONG TRAVERSE (KM.)
TEST CAL2 TRAVERSE 10 LEG 0
DATE: 9/02/76 TIME: 1630-1737
TRAVERSE ROUTE: EAST ON I580, I205, HWY 120, NORTH ON HWY 99
STARTING POINT: JUNC. FOOTHILL ROAD AND I580
CBrF3
CONC. (PPT)
0
100
200
300
0
31
62
93
DISTANCE ALONG TRAVERSE (KM.)
TEST CAL2 TRAVERSE 11 LEG 0
DATE: 9/02/76 TIME: 1731-1815
TRAVERSE ROUTE: EAST ON I205, HWY 120, NORTH ON HWY 99
STARTING POINT: JUNC. MACARTHUR DRIVE AND I205
CONC. (PPT)
0
20
40
0
22
44
66
DISTANCE ALONG TRAVERSE (KM.)

Figure 78.
TEST CAL2 TRAVERSE 11 LEG 0
DATE: 9/02/76 TIME: 1731-1815
TRAVERSE ROUTE: EAST ON I205,HWY 120, NORTH ON HWY 99
STARTING POINT: JUNC. MACARTHUR DRIVE AND I205

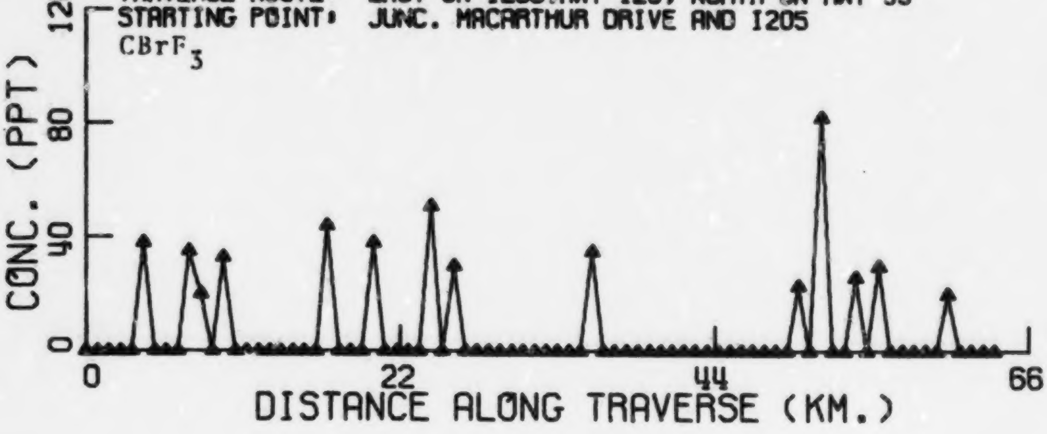


Figure 79.

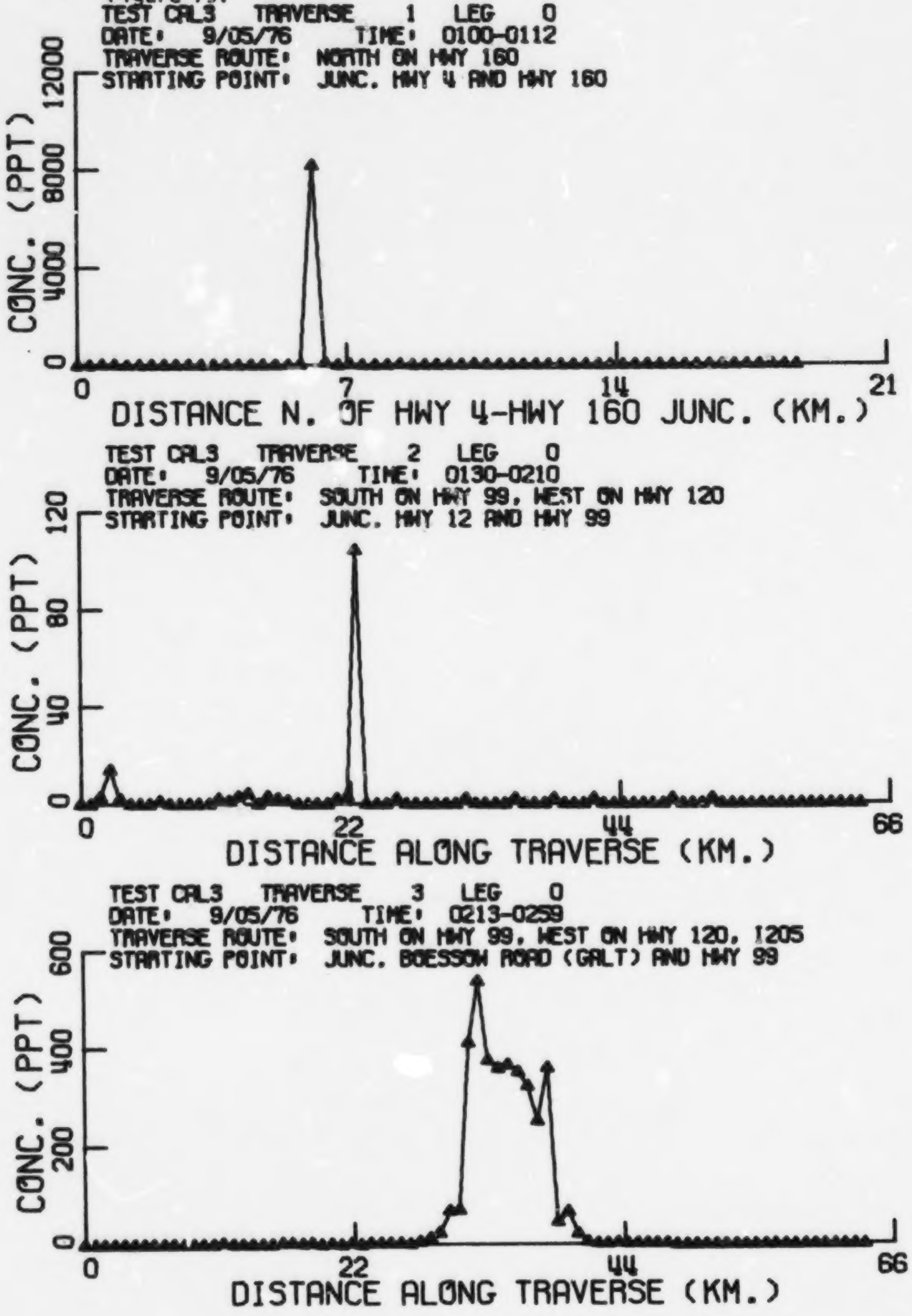

TEST CAL3 TRAVERSE 1 LEG 0
DATE: 9/05/76 TIME: 0100-0112
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: JUNC. HWY 4 AND HWY 160
CONC. (PPT)
0
4000
8000
12000
0
7
14
21
DISTANCE N. OF HWY 4-HWY 160 JUNC. (KM.)
TEST CAL3 TRAVERSE 2 LEG 0
DATE: 9/05/76 TIME: 0130-0210
TRAVERSE ROUTE: SOUTH ON HWY 99, WEST ON HWY 120
STARTING POINT: JUNC. HWY 12 AND HWY 99
CONC. (PPT)
0
40
80
120
0
22
44
66
DISTANCE ALONG TRAVERSE (KM.)
TEST CAL3 TRAVERSE 3 LEG 0
DATE: 9/05/76 TIME: 0213-0259
TRAVERSE ROUTE: SOUTH ON HWY 99, WEST ON HWY 120, I205
STARTING POINT: JUNC. BOESSOW ROAD (GALT) AND HWY 99
CONC. (PPT)
0
200
400
600
0
22
44
66
DISTANCE ALONG TRAVERSE (KM.)

Figure 80.

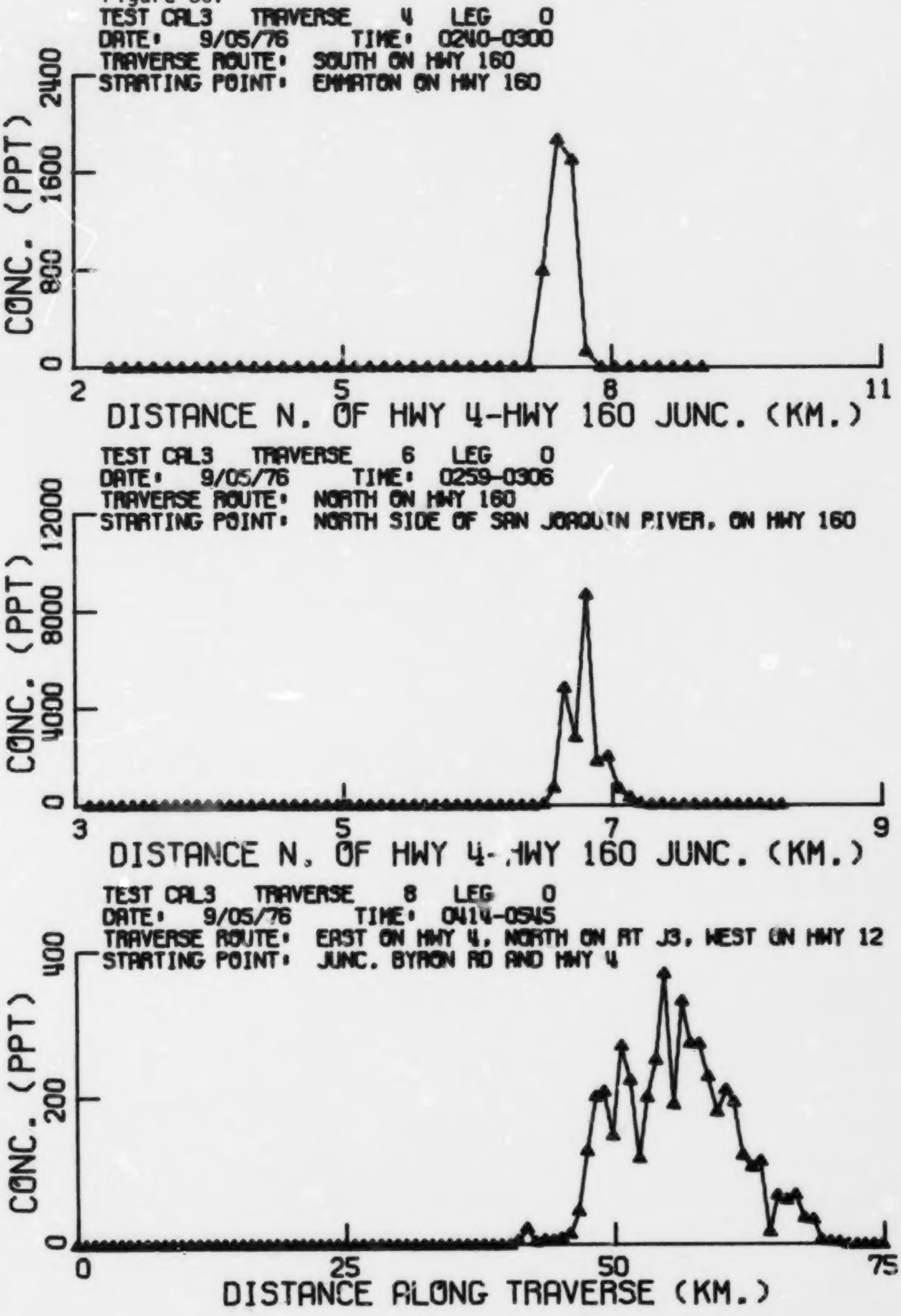
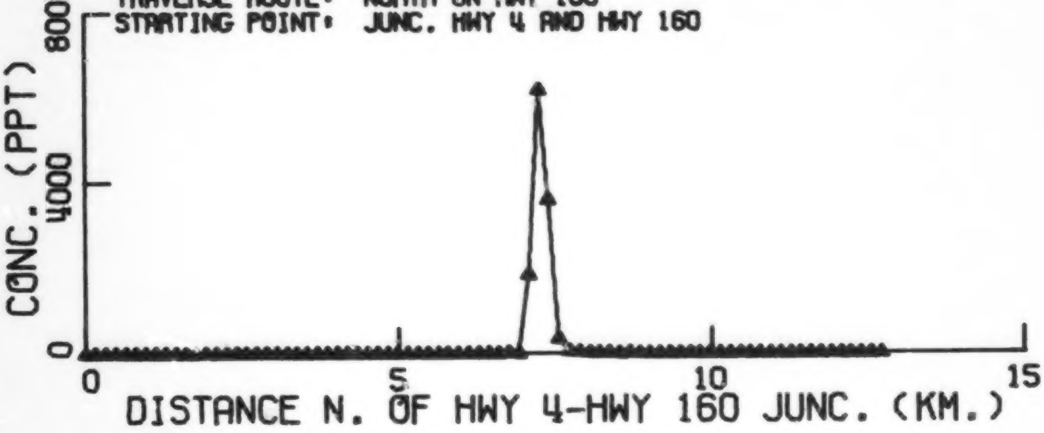
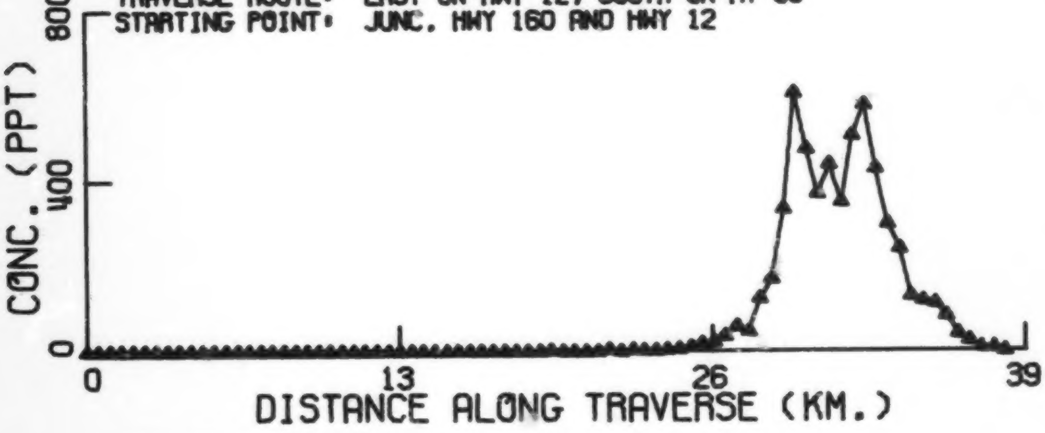

TEST CAL3 TRAVERSE 4 LEG 0
DATE: 9/05/76 TIME: 0240-0300
TRAVERSE ROUTE: SOUTH ON HWY 160
STARTING POINT: EMMATON ON HWY 160
CONC. (PPT)
0
800
1600
2400
2
5
8
11
DISTANCE N. OF HWY 4-HWY 160 JUNC. (KM.)
TEST CAL3 TRAVERSE 6 LEG 0
DATE: 9/05/76 TIME: 0259-0306
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: NORTH SIDE OF SAN JOAQUIN RIVER, ON HWY 160
CONC. (PPT)
0
4000
8000
12000
3
5
7
9
DISTANCE N. OF HWY 4-HWY 160 JUNC. (KM.)
TEST CAL3 TRAVERSE 8 LEG 0
DATE: 9/05/76 TIME: 0414-0545
TRAVERSE ROUTE: EAST ON HWY 4, NORTH ON RT J3, WEST ON HWY 12
STARTING POINT: JUNC. BYRON RD AND HWY 4
CONC. (PPT)
0
200
400
0
25
50
75
DISTANCE ALONG TRAVERSE (KM.)

Figure 81.

TEST CAL3 TRAVERSE 9 LEG 0
DATE: 9/05/76 TIME: 0430-0445
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: JUNC. HWY 4 AND HWY 160



TEST CAL3 TRAVERSE 10 LEG 0
DATE: 9/05/76 TIME: 0432-0517
TRAVERSE ROUTE: EAST ON HWY 12, SOUTH ON RT J8
STARTING POINT: JUNC. HWY 160 AND HWY 12



TEST CAL3 TRAVERSE 11 LEG 0
DATE: 9/05/76 TIME: 0441-0450
TRAVERSE ROUTE: SOUTH ON HWY 160
STARTING POINT: THE 7BEAN POT7 ON HWY 160

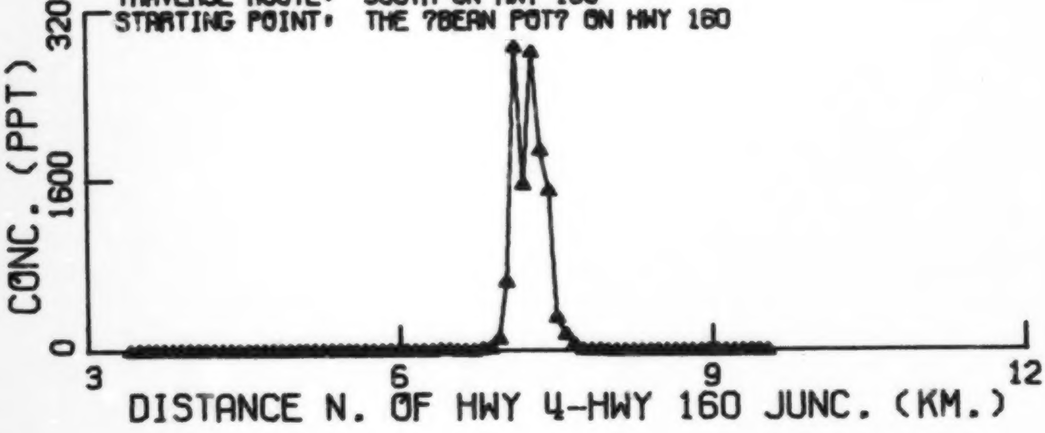


Figure 82.

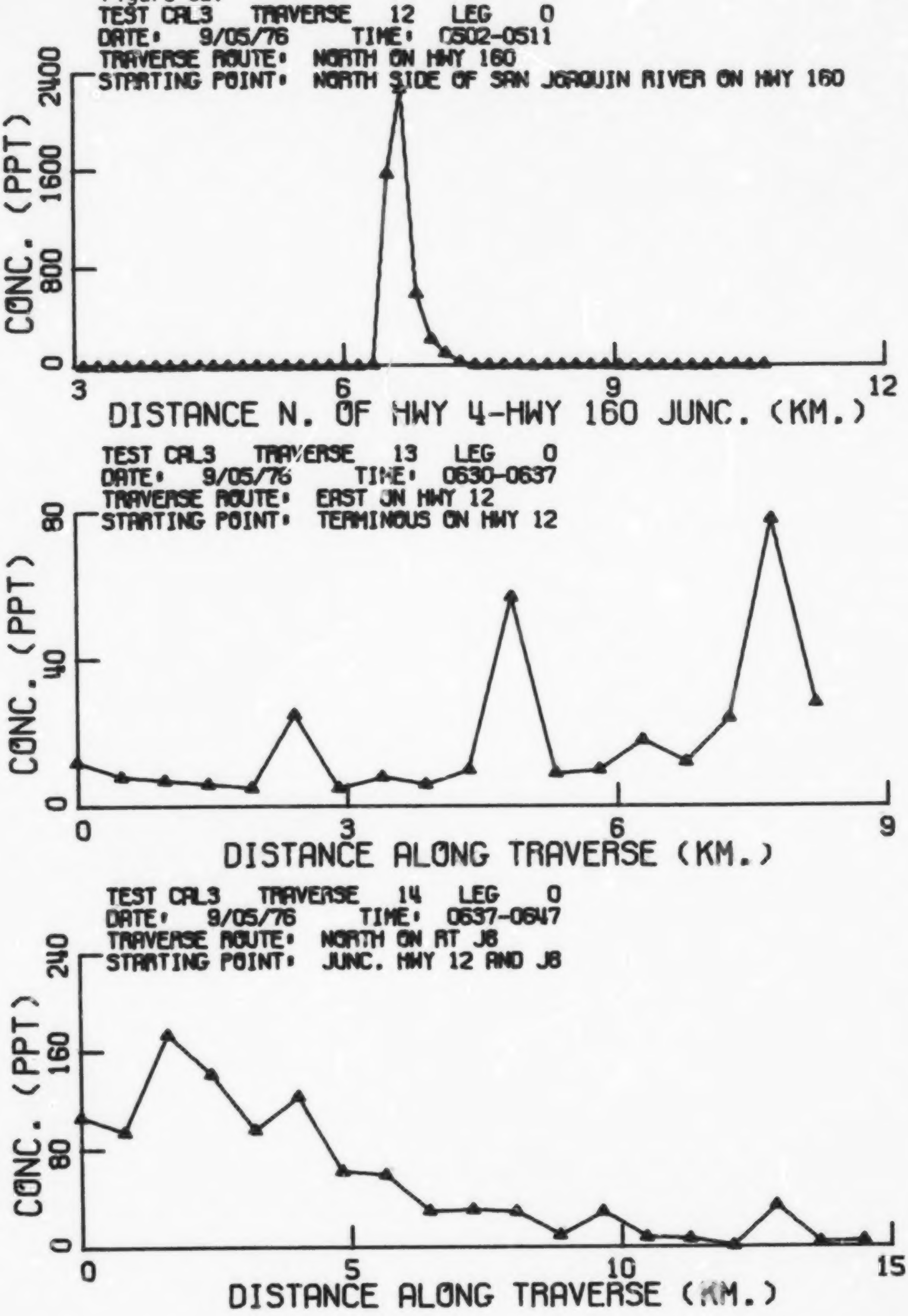

TEST CAL3 TRAVERSE 12 LEG 0
DATE: 9/05/76 TIME: 0502-0511
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: NORTH SIDE OF SAN JOAQUIN RIVER ON HWY 160
CONC. (PPT)
0
800
1600
2400
3
6
9
12
DISTANCE N. OF HWY 4-HWY 160 JUNC. (KM.)
TEST CAL3 TRAVERSE 13 LEG 0
DATE: 9/05/76 TIME: 0630-0637
TRAVERSE ROUTE: EAST ON HWY 12
STARTING POINT: TERMINOUS ON HWY 12
CONC. (PPT)
0
40
80
0
3
6
9
DISTANCE ALONG TRAVERSE (KM.)
TEST CAL3 TRAVERSE 14 LEG 0
DATE: 9/05/76 TIME: 0637-0647
TRAVERSE ROUTE: NORTH ON RT J8
STARTING POINT: JUNC. HWY 12 AND J8
CONC. (PPT)
0
80
160
240
0
5
10
15
DISTANCE ALONG TRAVERSE (KM.)

Figure 83.

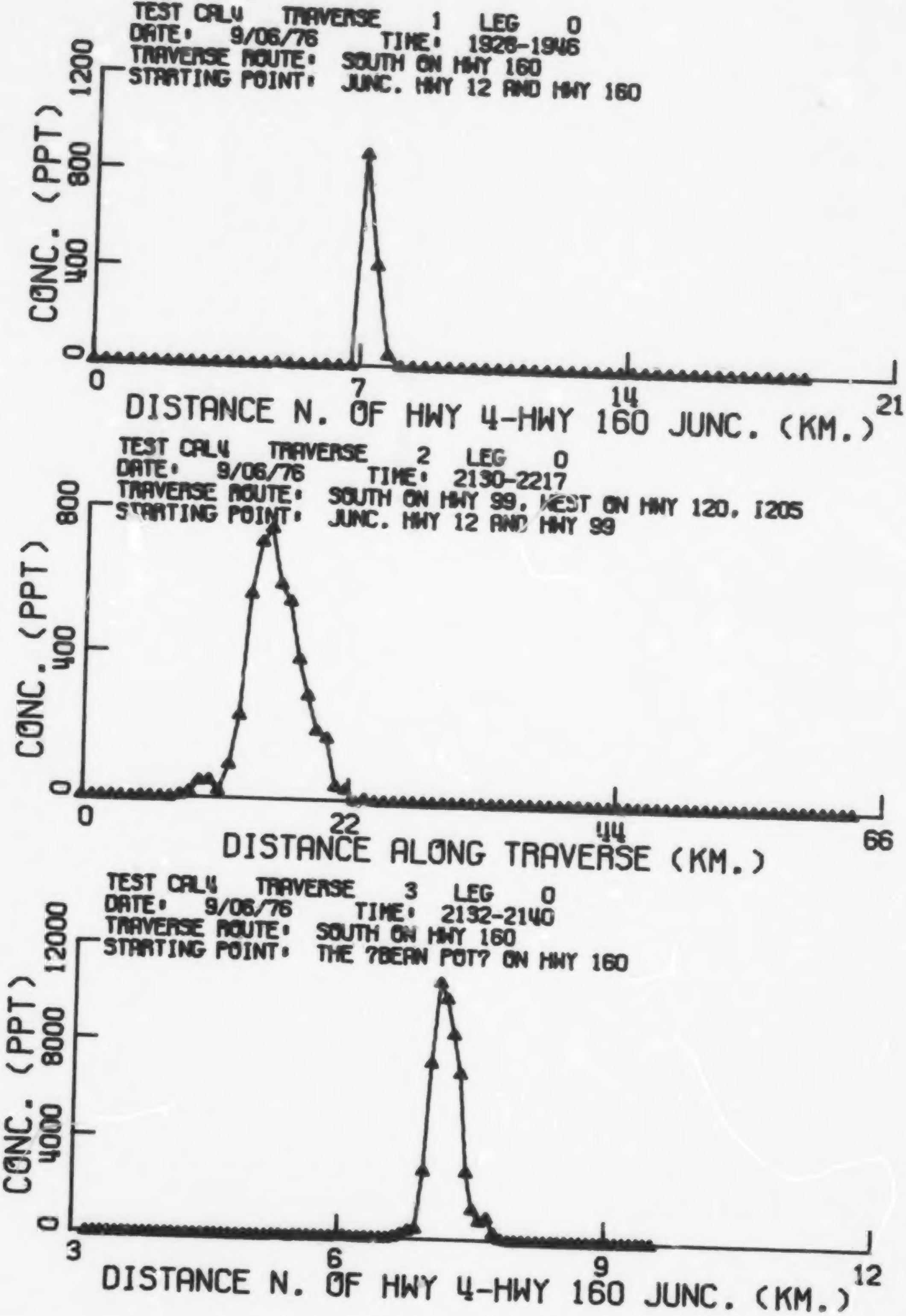
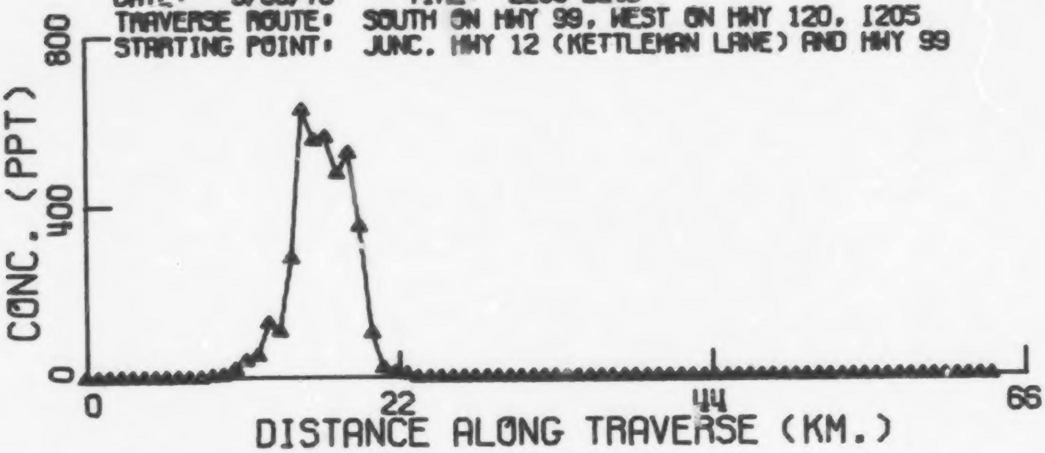
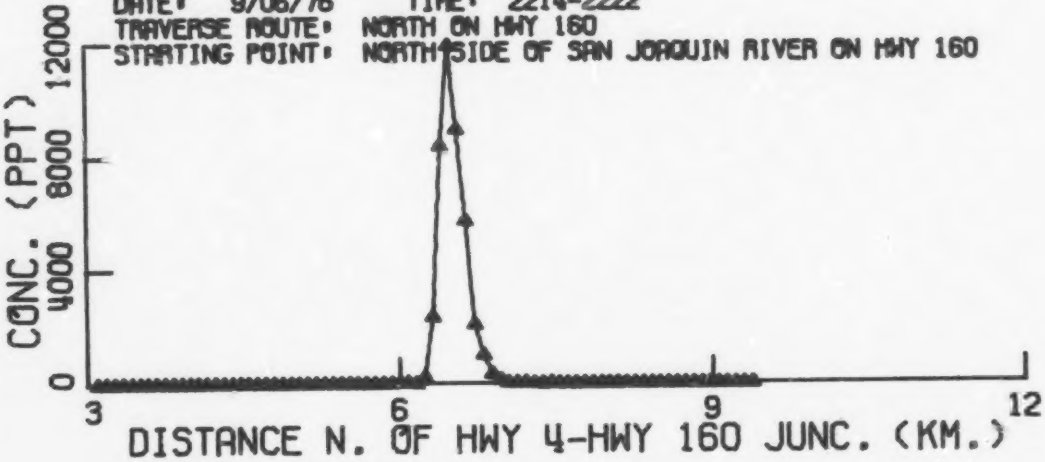

TEST CAL4 TRAVERSE 1 LEG 0
DATE: 9/06/76 TIME: 1928-1946
TRAVERSE ROUTE: SOUTH ON HWY 160
STARTING POINT: JUNC. HWY 12 AND HWY 160
CONC. (PPT)
0
400
800
1200
0
7
14
21
DISTANCE N. OF HWY 4-HWY 160 JUNC. (KM.)
TEST CAL4 TRAVERSE 2 LEG 0
DATE: 9/06/76 TIME: 2130-2217
TRAVERSE ROUTE: SOUTH ON HWY 99, WEST ON HWY 120, I205
STARTING POINT: JUNC. HWY 12 AND HWY 99
CONC. (PPT)
0
400
800
0
22
44
66
DISTANCE ALONG TRAVERSE (KM.)
TEST CAL4 TRAVERSE 3 LEG 0
DATE: 9/06/76 TIME: 2132-2140
TRAVERSE ROUTE: SOUTH ON HWY 160
STARTING POINT: THE ?BEAN POT? ON HWY 160
CONC. (PPT)
0
4000
8000
12000
3
6
9
12
DISTANCE N. OF HWY 4-HWY 160 JUNC. (KM.)

Figure 84.

TEST CAL4 TRAVERSE 4 LEG 0
DATE: 9/06/76 TIME: 2200-2246
TRAVERSE ROUTE: SOUTH ON HWY 99, WEST ON HWY 120, I205
STARTING POINT: JUNC. HWY 12 (KETTLEMAN LANE) AND HWY 99



TEST CAL4 TRAVERSE 5 LEG 0
DATE: 9/06/76 TIME: 2214-2222
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: NORTH SIDE OF SAN JOAQUIN RIVER ON HWY 160



TEST CAL4 TRAVERSE 6 LEG 0
DATE: 9/06/76 TIME: 2232-2320
TRAVERSE ROUTE: EAST ON I205, HWY 120, NORTH ON HWY 99
STARTING POINT: JUNC. TRACY BLVD. AND I205

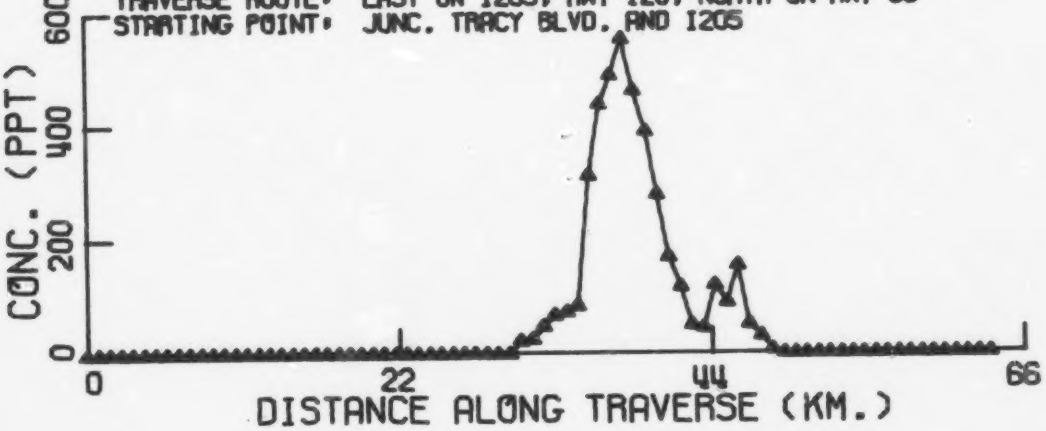
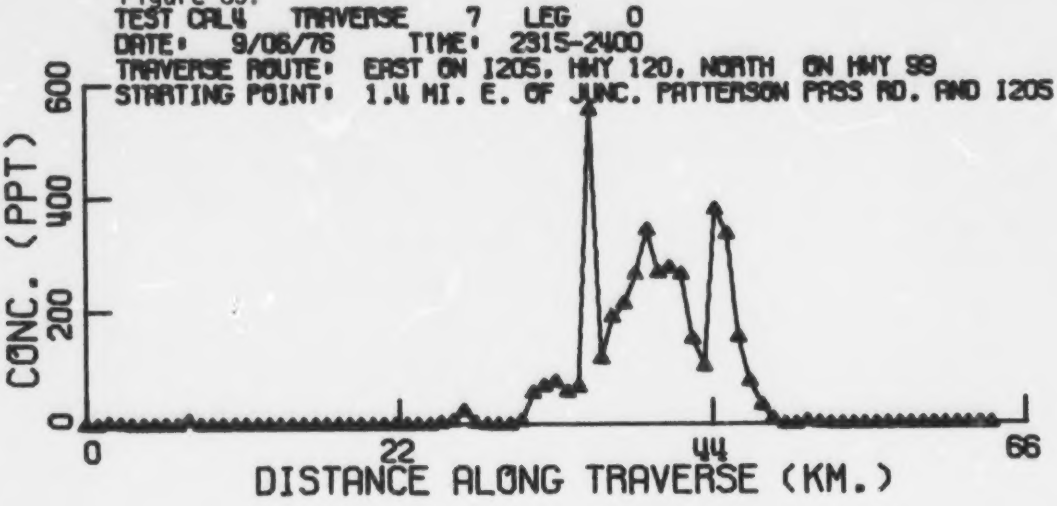


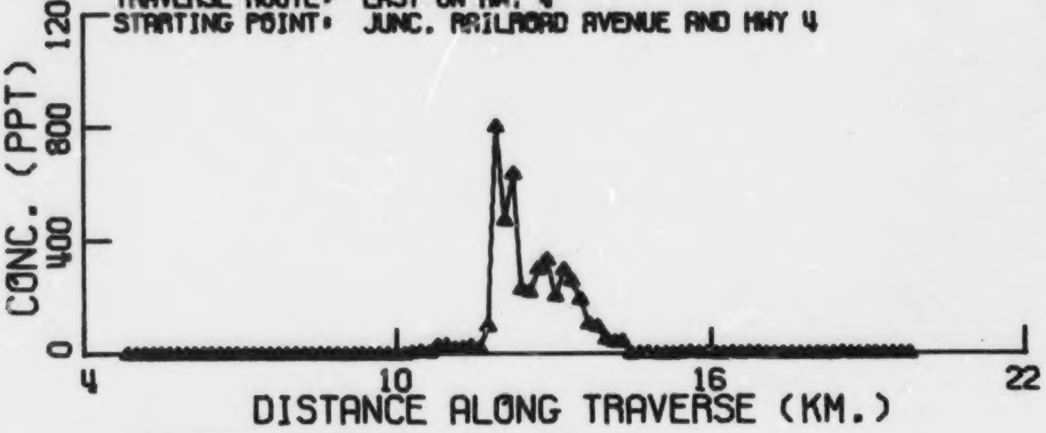
Figure 85.



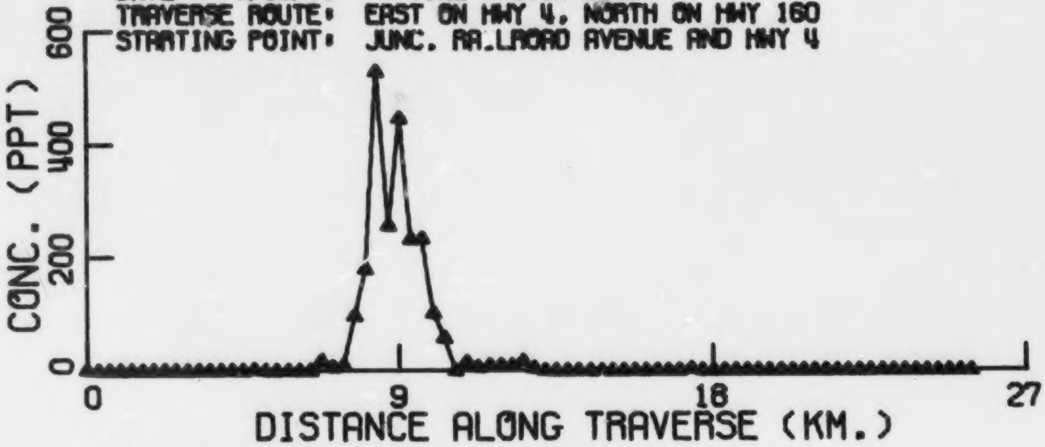
TEST CAL4 TRAVERSE 7 LEG 0
DATE: 9/06/76 TIME: 2315-2400
TRAVERSE ROUTE: EAST ON I205, HWY 120, NORTH ON HWY 99
STARTING POINT: 1.4 MI. E. OF JUNC. PATTERSON PASS RD. AND I205

Figure 86.

TEST CALS TRAVERSE 1 LEG 0
DATE: 9/09/76 TIME: 1255-1315
TRAVERSE ROUTE: EAST ON HWY 4
STARTING POINT: JUNC. RAILROAD AVENUE AND HWY 4



TEST CALS TRAVERSE 2 LEG 0
DATE: 9/09/76 TIME: 1314-1330
TRAVERSE ROUTE: EAST ON HWY 4, NORTH ON HWY 160
STARTING POINT: JUNC. RAILROAD AVENUE AND HWY 4



TEST CALS TRAVERSE 4 LEG 0
DATE: 9/09/76 TIME: 1351-1405
TRAVERSE ROUTE: EAST ON BALFOUR ROAD
STARTING POINT: JUNC. DEER VALLEY RD AND BALFOUR RD

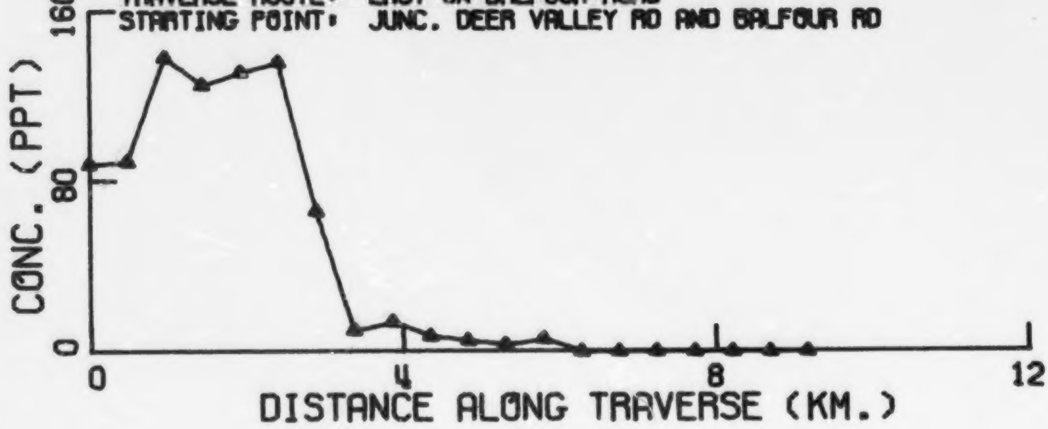
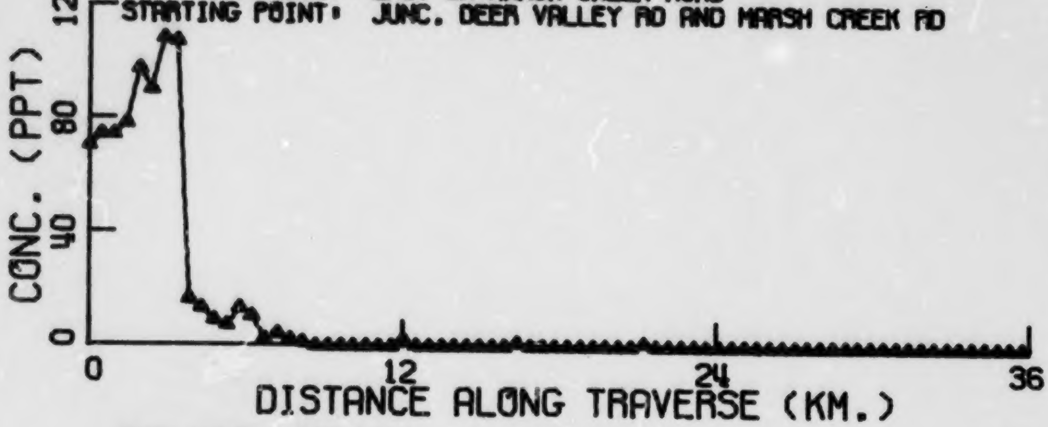
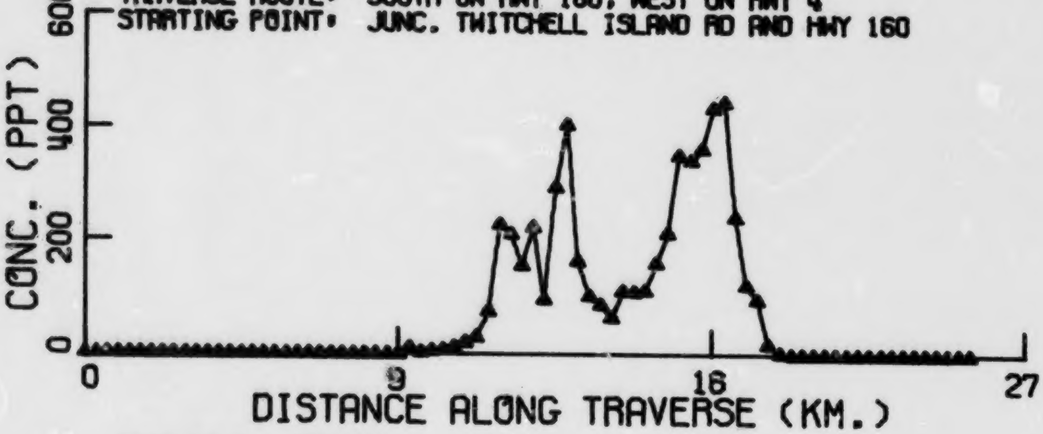


Figure 87.

TEST CALS TRAVERSE 5 LEG 0
DATE: 9/09/76 TIME: 1356-1428
TRAVERSE ROUTE: EAST ON MARSH CREEK ROAD
STARTING POINT: JUNC. DEER VALLEY RD AND MARSH CREEK RD



TEST CALS TRAVERSE 6 LEG 0
DATE: 9/09/76 TIME: 1359-1416
TRAVERSE ROUTE: SOUTH ON HWY 160, WEST ON HWY 4
STARTING POINT: JUNC. TWITCHELL ISLAND RD AND HWY 160



TEST CALS TRAVERSE 7 LEG 0
DATE: 9/09/76 TIME: 1413-1426
TRAVERSE ROUTE: WEST ON BALFOUR ROAD
STARTING POINT: JUNC. BYRON HWY AND BALFOUR RD

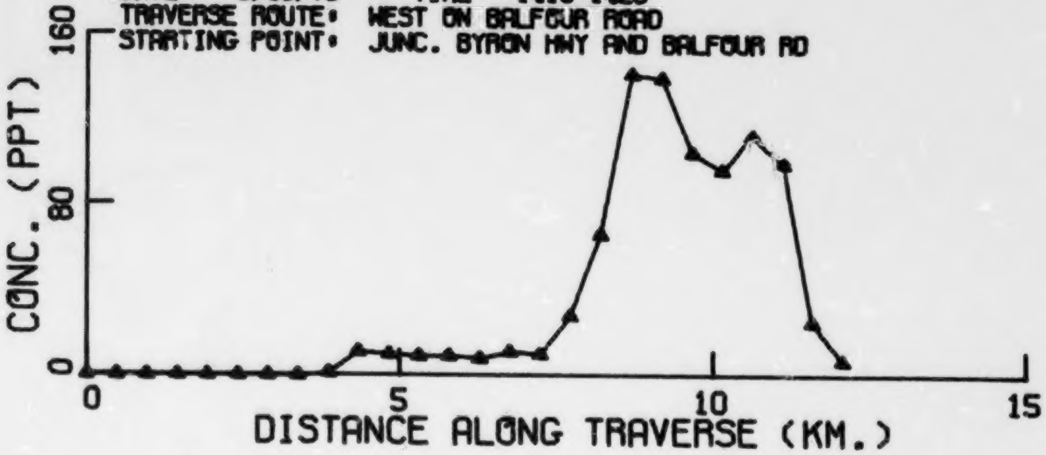


Figure 88.

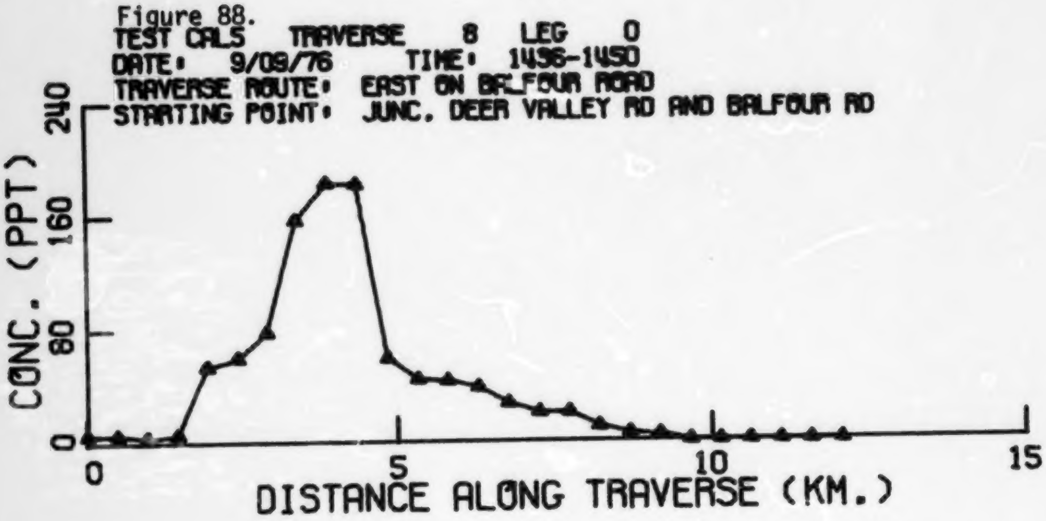
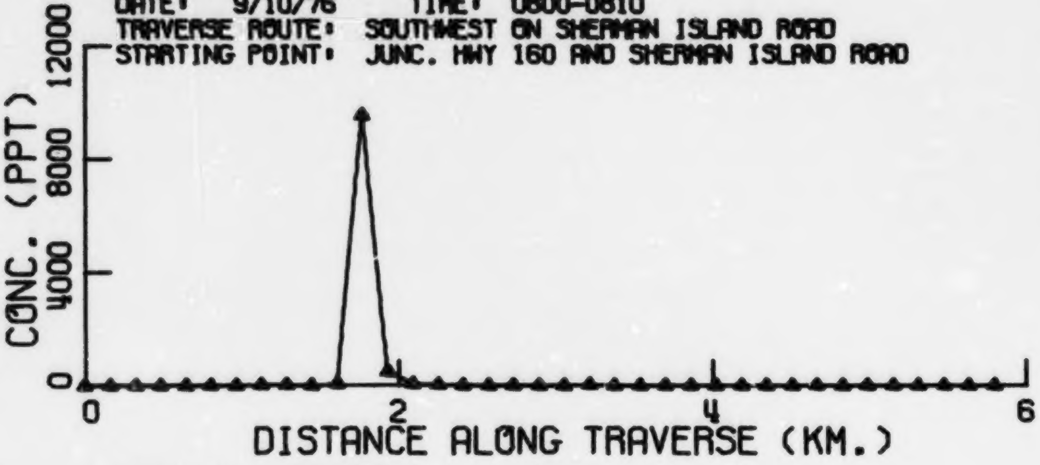
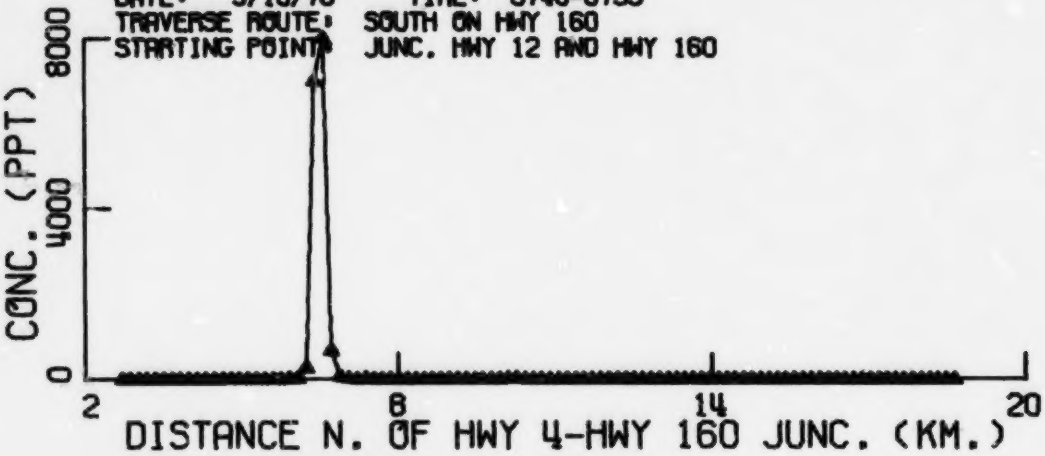

TEST CALS TRAVERSE 8 LEG 0
DATE: 9/09/76 TIME: 1436-1450
TRAVERSE ROUTE: EAST ON BALFOUR ROAD
STARTING POINT: JUNC. DEER VALLEY RD AND BALFOUR RD
CONC. (PPT)
0
80
160
240
0
5
10
15
DISTANCE ALONG TRAVERSE (KM.)

Figure 89.

TEST CAL6 TRAVERSE 1 LEG 0
DATE: 9/10/76 TIME: 0800-0810
TRAVERSE ROUTE: SOUTHWEST ON SHERMAN ISLAND ROAD
STARTING POINT: JUNC. HWY 160 AND SHERMAN ISLAND ROAD



TEST CAL6 TRAVERSE 2 LEG 0
DATE: 9/10/76 TIME: 0740-0753
TRAVERSE ROUTE: SOUTH ON HWY 160
STARTING POINT: JUNC. HWY 12 AND HWY 160



TEST CAL6 TRAVERSE 3 LEG 0
DATE: 9/10/76 TIME: 1001-1051
TRAVERSE ROUTE: SOUTH ON HWY 99, WEST ON HWY 120, I205
STARTING POINT: JUNC. HWY 12 AND HWY 99

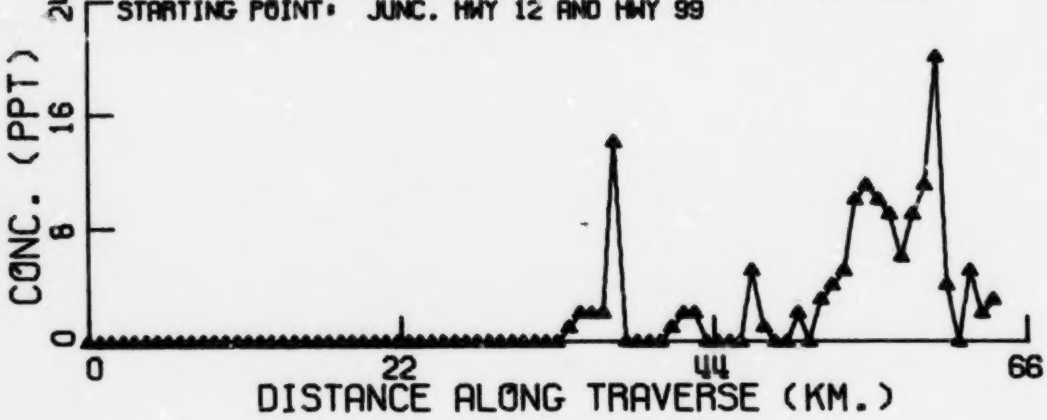
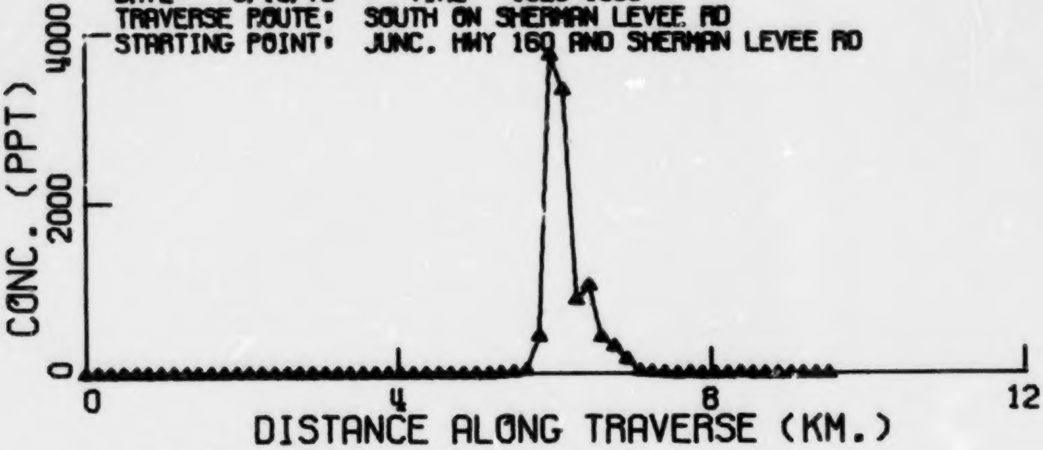
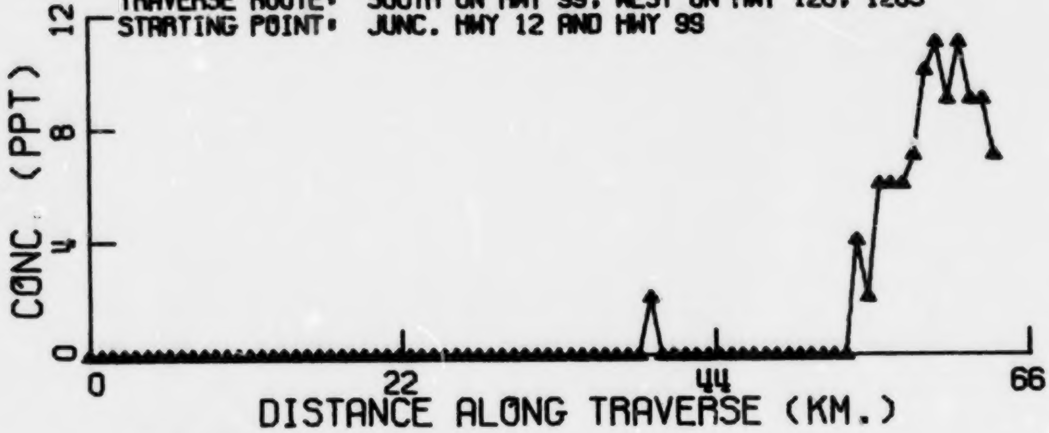


Figure 90.

TEST CAL6 TRAVERSE 4 LEG 0
DATE: 9/10/76 TIME: 1023-1033
TRAVERSE ROUTE: SOUTH ON SHERMAN LEVEE RD
STARTING POINT: JUNC. HWY 160 AND SHERMAN LEVEE RD



TEST CAL6 TRAVERSE 5 LEG 0
DATE: 9/10/76 TIME: 1030-1115
TRAVERSE ROUTE: SOUTH ON HWY 99, WEST ON HWY 120, I205
STARTING POINT: JUNC. HWY 12 AND HWY 99



TEST CAL6 TRAVERSE 6 LEG 0
DATE: 9/10/76 TIME: 1022-1033
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: NORTH SIDE, SAN JOAQUIN RIVER BRIDGE ON HWY 160

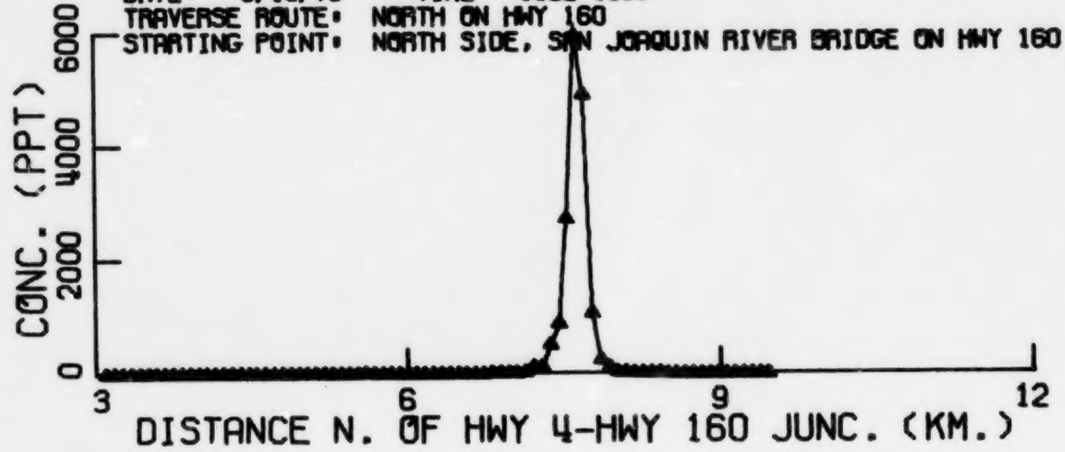
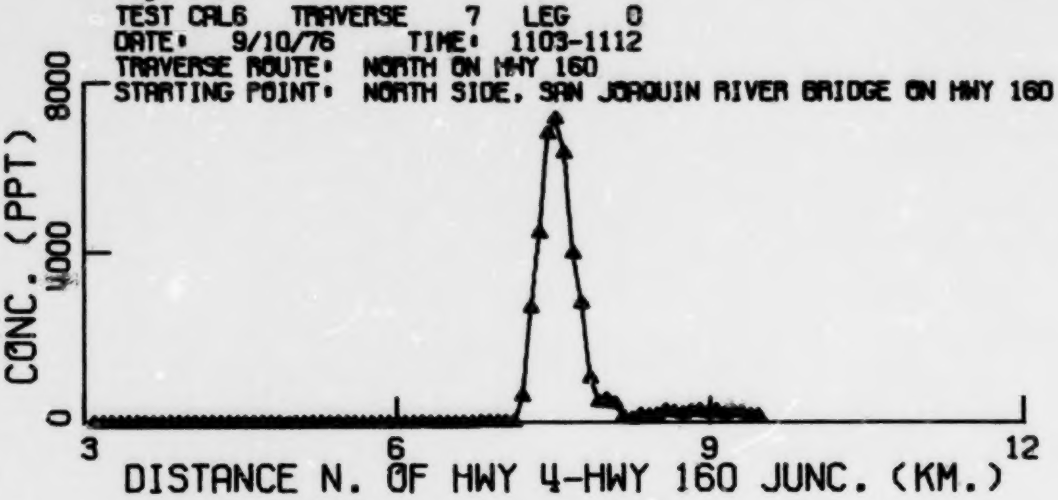


Figure 91.


TEST CAL6 TRAVERSE 7 LEG 0
DATE: 9/10/76 TIME: 1103-1112
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: NORTH SIDE, SAN JOAQUIN RIVER BRIDGE ON HWY 160

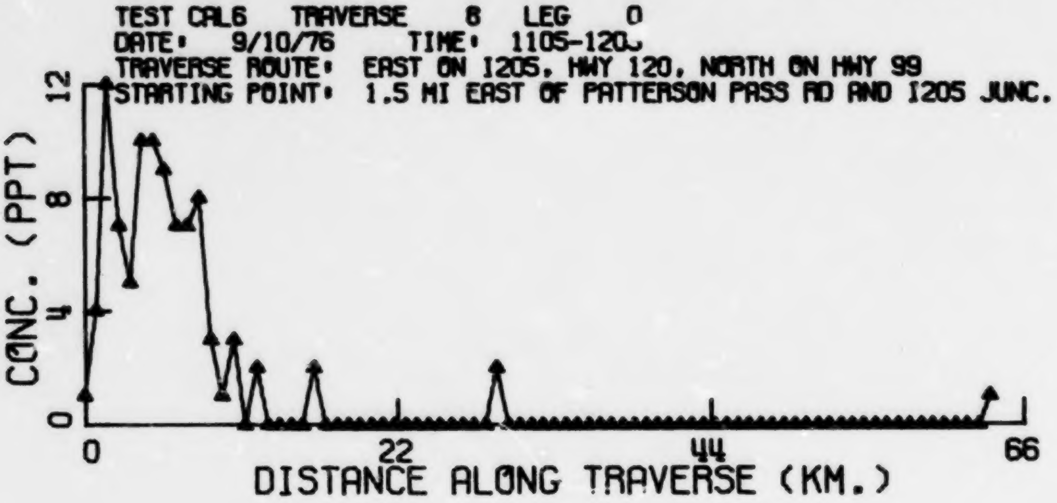
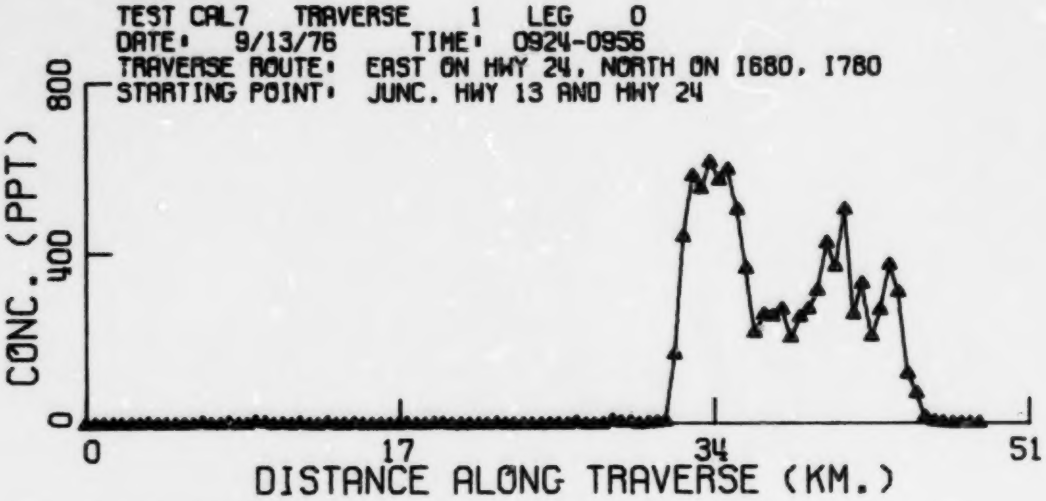
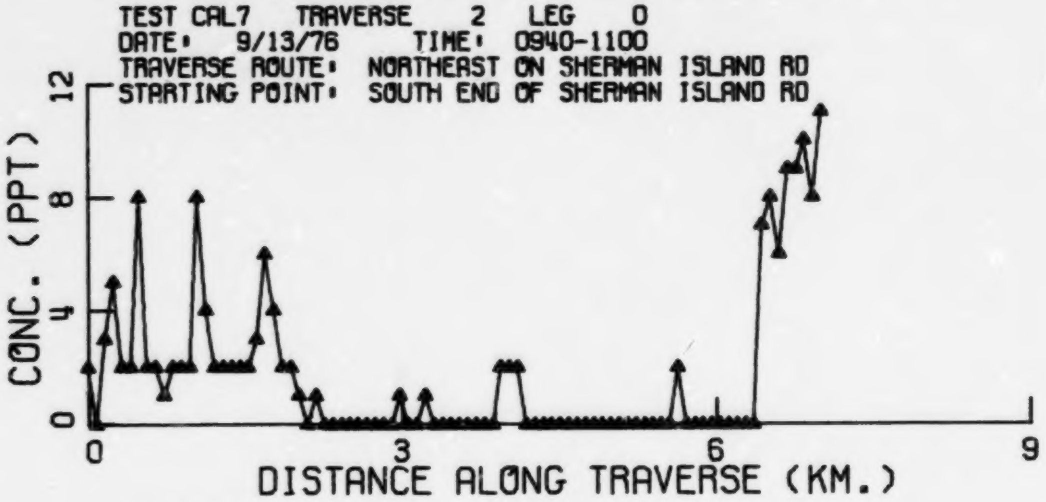

TEST CAL6 TRAVERSE 8 LEG 0
DATE: 9/10/76 TIME: 1105-120
TRAVERSE ROUTE: EAST ON I205, HWY 120, NORTH ON HWY 99
STARTING POINT: 1.5 MI EAST OF PATTERSON PASS RD AND I205 JUNC.

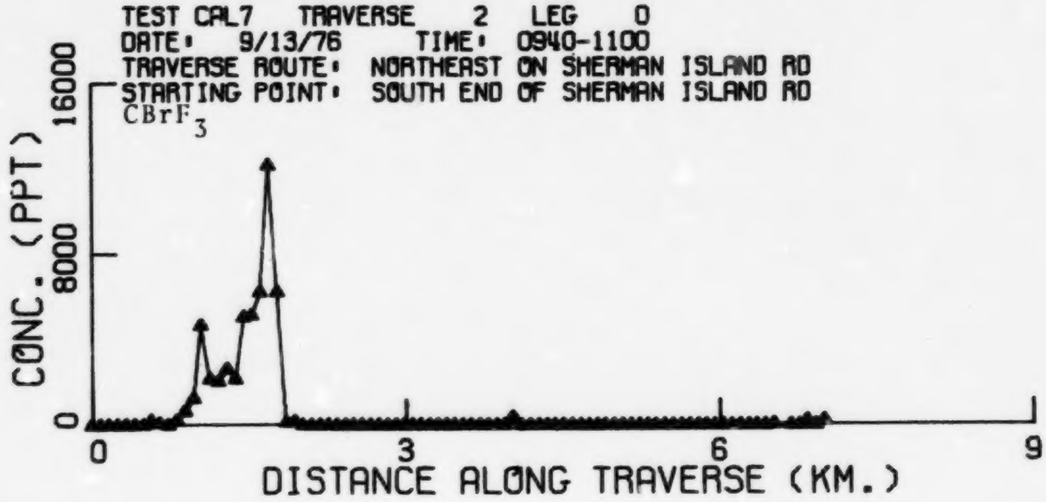
Figure 92.



TEST CAL7 TRAVERSE 1 LEG 0
DATE: 9/13/76 TIME: 0924-0956
TRAVERSE ROUTE: EAST ON HWY 24, NORTH ON I680, I780
STARTING POINT: JUNC. HWY 13 AND HWY 24



TEST CAL7 TRAVERSE 2 LEG 0
DATE: 9/13/76 TIME: 0940-1100
TRAVERSE ROUTE: NORTHEAST ON SHERMAN ISLAND RD
STARTING POINT: SOUTH END OF SHERMAN ISLAND RD



TEST CAL7 TRAVERSE 2 LEG 0
DATE: 9/13/76 TIME: 0940-1100
TRAVERSE ROUTE: NORTHEAST ON SHERMAN ISLAND RD
STARTING POINT: SOUTH END OF SHERMAN ISLAND RD

Figure 93.

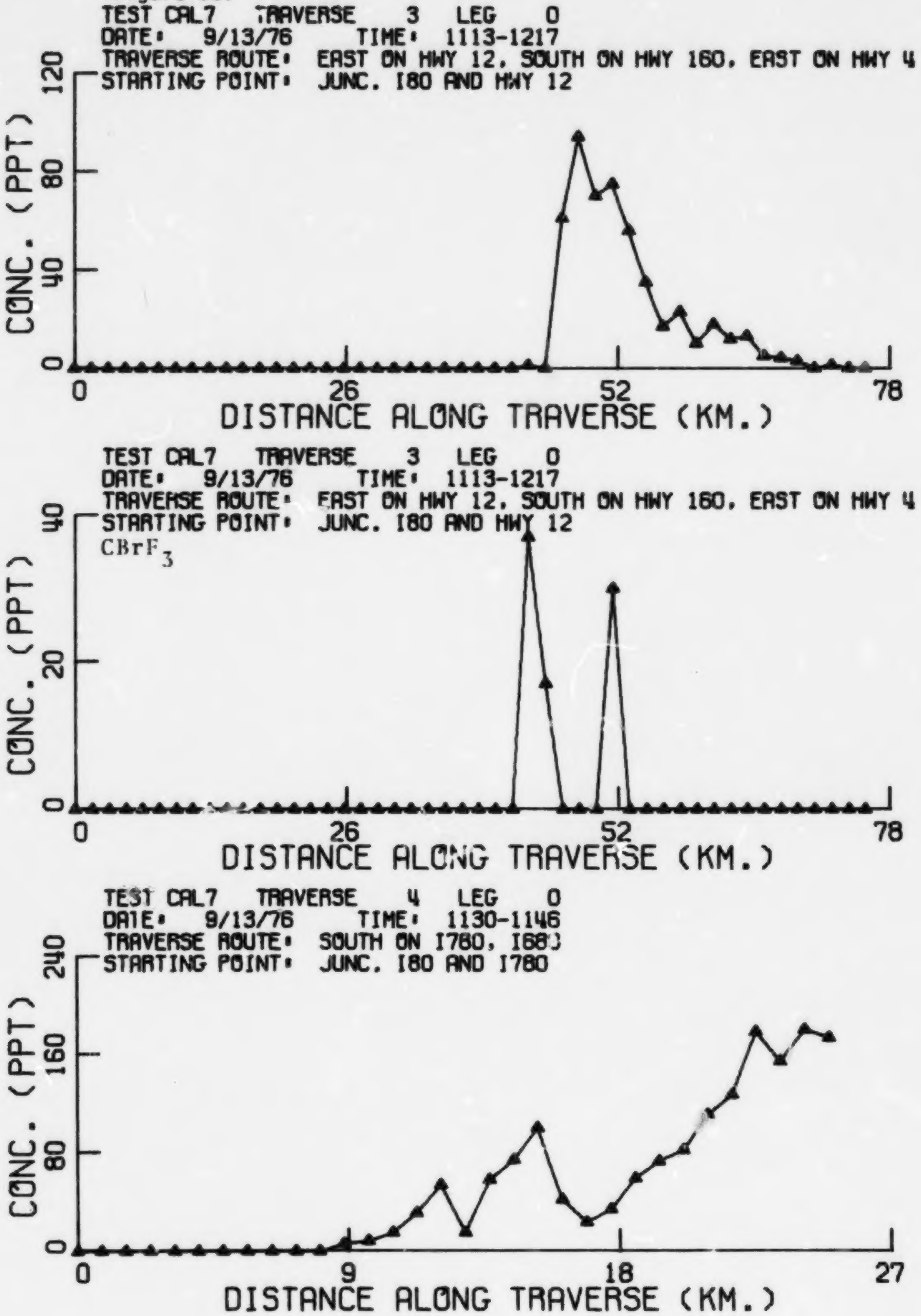

TEST CAL7 TRAVERSE 3 LEG 0
DATE: 9/13/76 TIME: 1113-1217
TRAVERSE ROUTE: EAST ON HWY 12, SOUTH ON HWY 160, EAST ON HWY 4
STARTING POINT: JUNC. I80 AND HWY 12
CONC. (PPT)
0
40
80
120
0
26
52
78
DISTANCE ALONG TRAVERSE (KM.)
TEST CAL7 TRAVERSE 3 LEG 0
DATE: 9/13/76 TIME: 1113-1217
TRAVERSE ROUTE: EAST ON HWY 12, SOUTH ON HWY 160, EAST ON HWY 4
STARTING POINT: JUNC. I80 AND HWY 12
$CBrF_3$
CONC. (PPT)
0
20
40
0
26
52
78
DISTANCE ALONG TRAVERSE (KM.)
TEST CAL7 TRAVERSE 4 LEG 0
DATE: 9/13/76 TIME: 1130-1146
TRAVERSE ROUTE: SOUTH ON I780, I680
STARTING POINT: JUNC. I80 AND I780
CONC. (PPT)
0
80
160
240
0
9
18
27
DISTANCE ALONG TRAVERSE (KM.)

Figure 94.

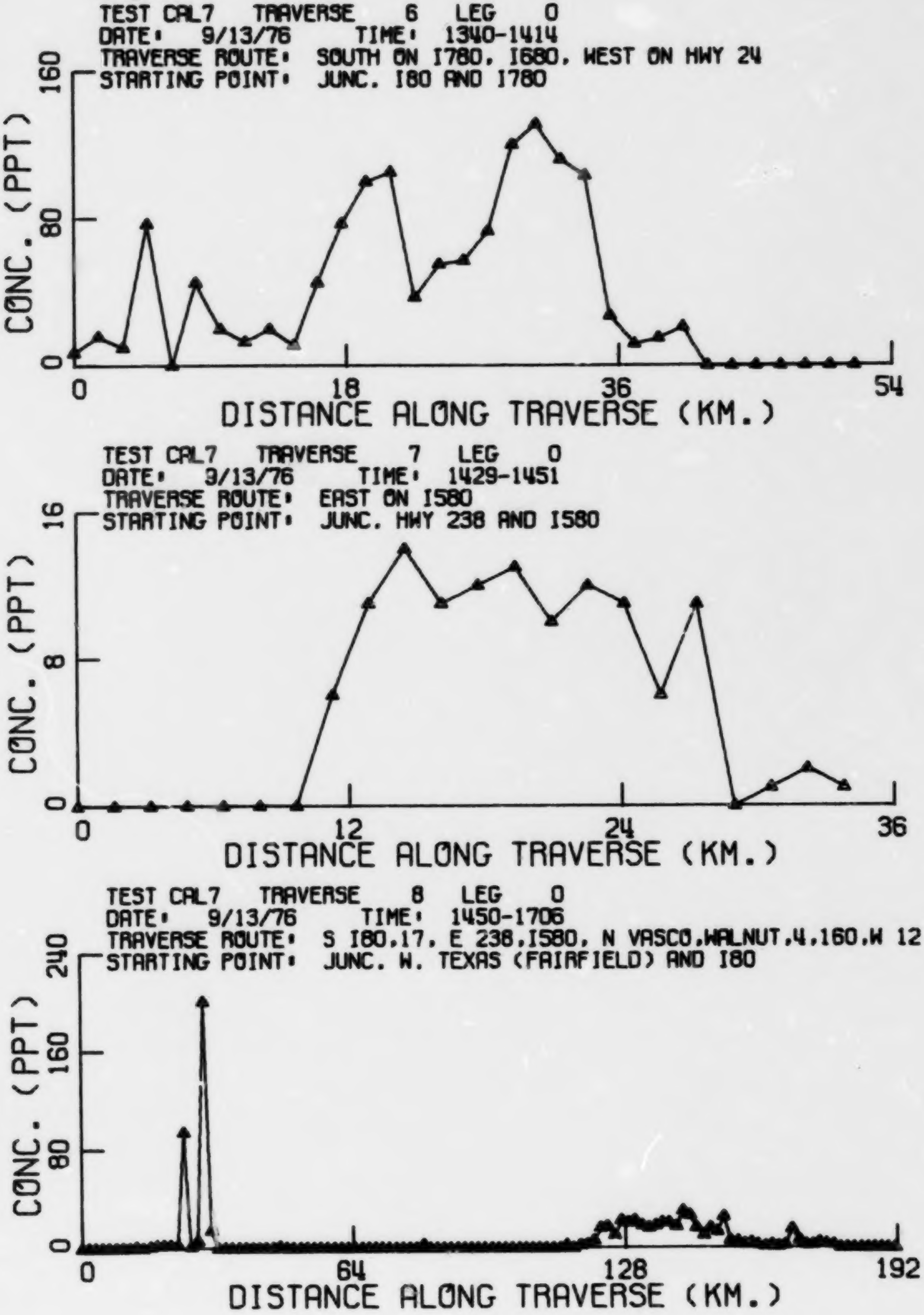

TEST CAL7 TRAVERSE 6 LEG 0
DATE: 9/13/76 TIME: 1340-1414
TRAVERSE ROUTE: SOUTH ON I780, I680, WEST ON HWY 24
STARTING POINT: JUNC. I80 AND I780
CONC. (PPT)
0
80
160
0
18
36
54
DISTANCE ALONG TRAVERSE (KM.)
TEST CAL7 TRAVERSE 7 LEG 0
DATE: 9/13/76 TIME: 1429-1451
TRAVERSE ROUTE: EAST ON I580
STARTING POINT: JUNC. HWY 238 AND I580
CONC. (PPT)
0
8
16
0
12
24
36
DISTANCE ALONG TRAVERSE (KM.)
TEST CAL7 TRAVERSE 8 LEG 0
DATE: 9/13/76 TIME: 1450-1706
TRAVERSE ROUTE: S I80,17, E 238,I580, N VASCO,WALNUT,4,160,W 12
STARTING POINT: JUNC. W. TEXAS (FAIRFIELD) AND I80
CONC. (PPT)
0
80
160
240
0
64
128
192
DISTANCE ALONG TRAVERSE (KM.)

Figure 95.

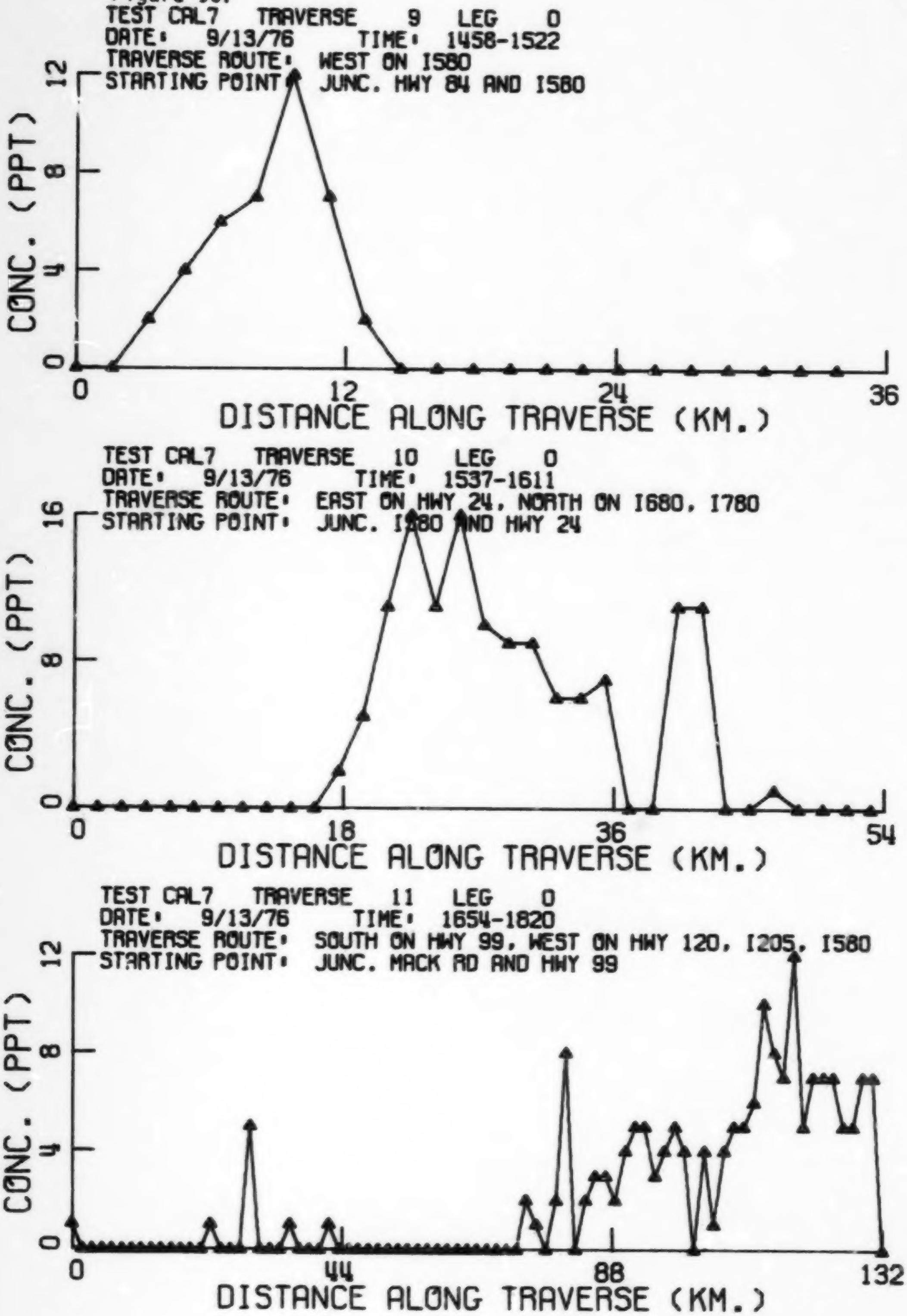
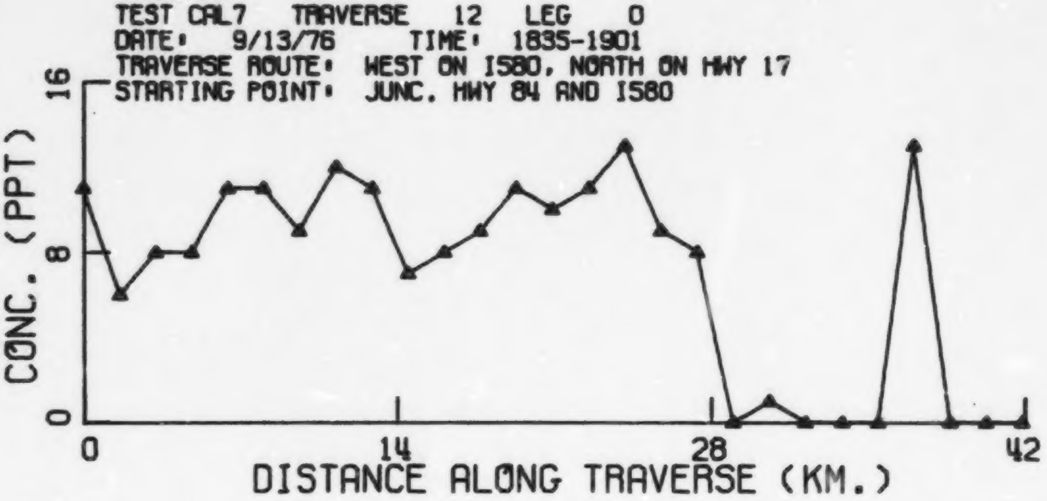
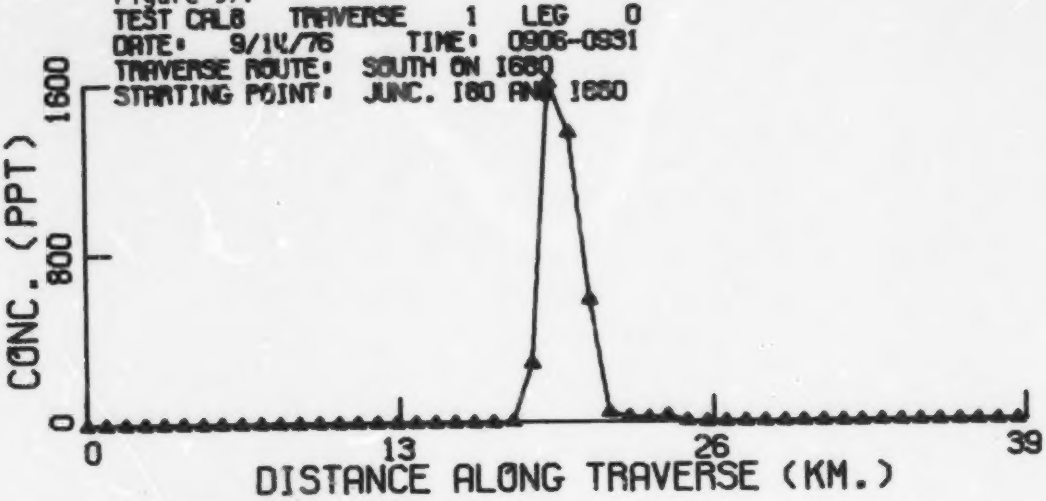

TEST CAL7 TRAVERSE 9 LEG 0
DATE: 9/13/76 TIME: 1458-1522
TRAVERSE ROUTE: WEST ON I580
STARTING POINT: JUNC. HWY 84 AND I580
CONC. (PPT)
0
4
8
12
0
12
24
36
DISTANCE ALONG TRAVERSE (KM.)
TEST CAL7 TRAVERSE 10 LEG 0
DATE: 9/13/76 TIME: 1537-1611
TRAVERSE ROUTE: EAST ON HWY 24, NORTH ON I680, I780
STARTING POINT: JUNC. I580 AND HWY 24
CONC. (PPT)
0
8
16
0
18
36
54
DISTANCE ALONG TRAVERSE (KM.)
TEST CAL7 TRAVERSE 11 LEG 0
DATE: 9/13/76 TIME: 1654-1820
TRAVERSE ROUTE: SOUTH ON HWY 99, WEST ON HWY 120, I205, I580
STARTING POINT: JUNC. MACK RD AND HWY 99
CONC. (PPT)
0
4
8
12
0
44
88
132
DISTANCE ALONG TRAVERSE (KM.)

Figure 96.

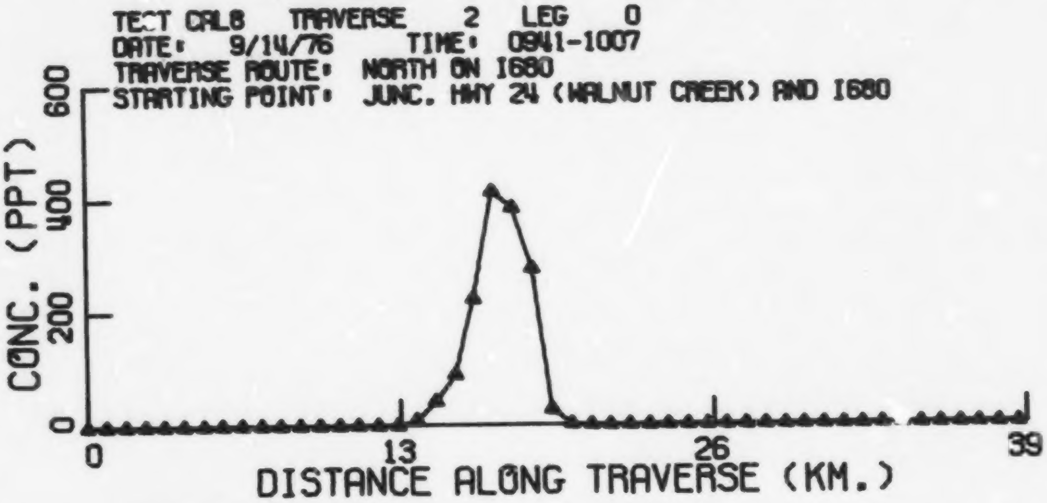


TEST CAL7 TRAVERSE 12 LEG 0
DATE: 9/13/76 TIME: 1835-1901
TRAVERSE ROUTE: WEST ON I580, NORTH ON HWY 17
STARTING POINT: JUNC. HWY 84 AND I580

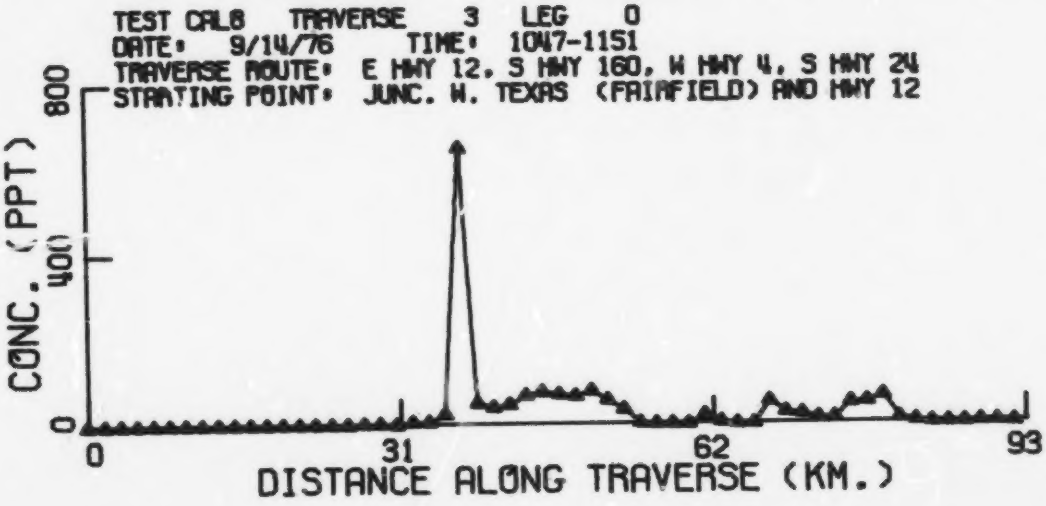
Figure 97.



TEST CAL8 TRAVERSE 1 LEG 0
DATE: 9/14/76 TIME: 0906-0931
TRAVERSE ROUTE: SOUTH ON I680
STARTING POINT: JUNC. I80 AND I680

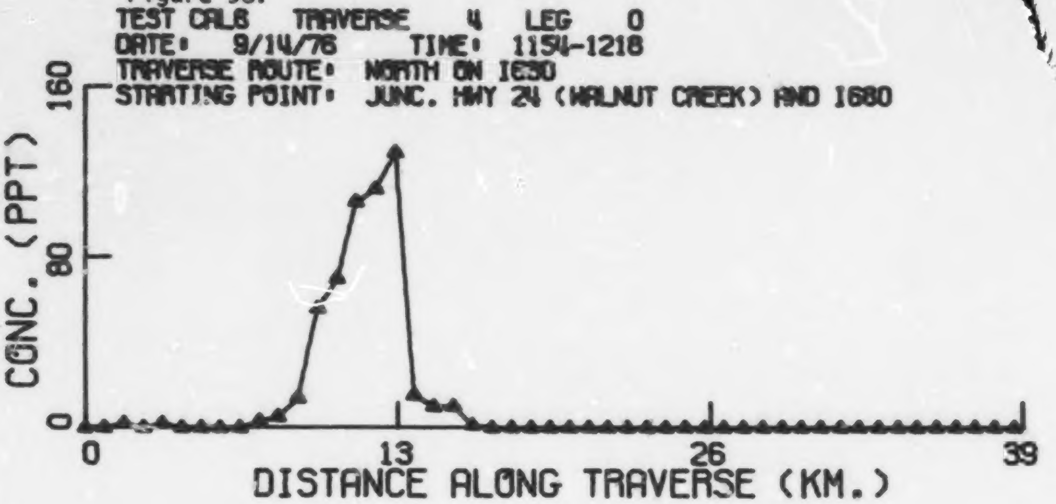


TEST CAL8 TRAVERSE 2 LEG 0
DATE: 9/14/76 TIME: 0941-1007
TRAVERSE ROUTE: NORTH ON I680
STARTING POINT: JUNC. HWY 24 (WALNUT CREEK) AND I680



TEST CAL8 TRAVERSE 3 LEG 0
DATE: 9/14/76 TIME: 1047-1151
TRAVERSE ROUTE: E HWY 12, S HWY 160, W HWY 4, S HWY 24
STARTING POINT: JUNC. W. TEXAS (FAIRFIELD) AND HWY 12

Figure 98.



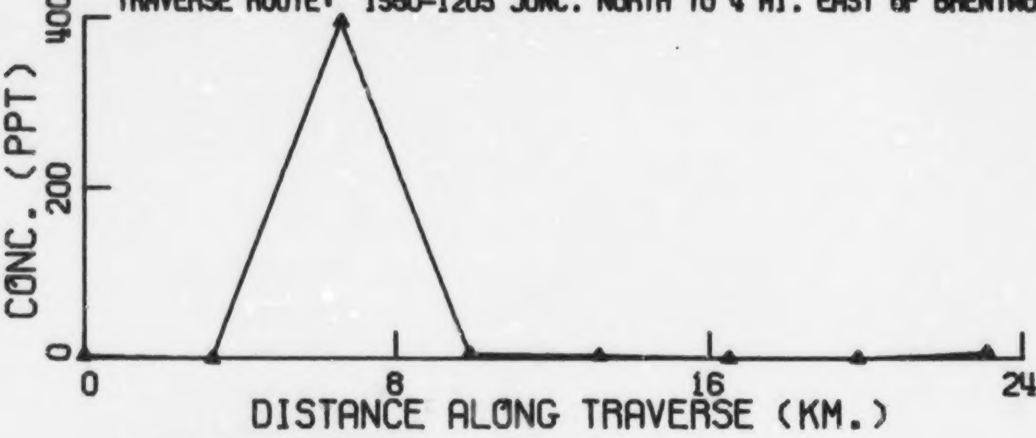
TEST CALB TRAVERSE 4 LEG 0
DATE: 9/14/76 TIME: 1154-1218
TRAVERSE ROUTE: NORTH ON I680
STARTING POINT: JUNC. HWY 24 (WALNUT CREEK) AND I680

3.4 Airborne Traverse Tracer Data

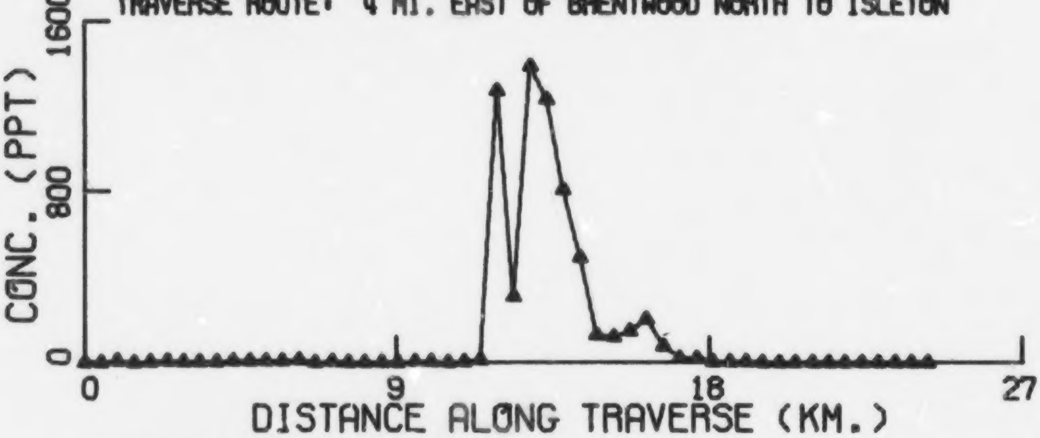
The airborne traverse tracer data are plotted in the following figures as concentration versus distance along the traverse. The altitudes of the traverse are given in meters above sea level. The topography of the region is such that it is reasonable to assume the specified altitude corresponds to the height above the surface.

Figure 99.

TEST CAL6 TRAVERSE 4 ALT. (M) 183
DATE: 9/10/76 TIME: 1044-1052
TRAVERSE ROUTE: I580-I205 JUNC. NORTH TO 4 MI. EAST OF BRENTWOOD



TEST CAL6 TRAVERSE 5 ALT. (M) 183
DATE: 9/10/76 TIME: 1054-1107
TRAVERSE ROUTE: 4 MI. EAST OF BRENTWOOD NORTH TO ISLETON



TEST CAL6 TRAVERSE 7 ALT. (M) 427
DATE: 9/10/76 TIME: 1140-1153
TRAVERSE ROUTE: ISLETON SOUTH TO 4 MI. EAST OF BRENTWOOD

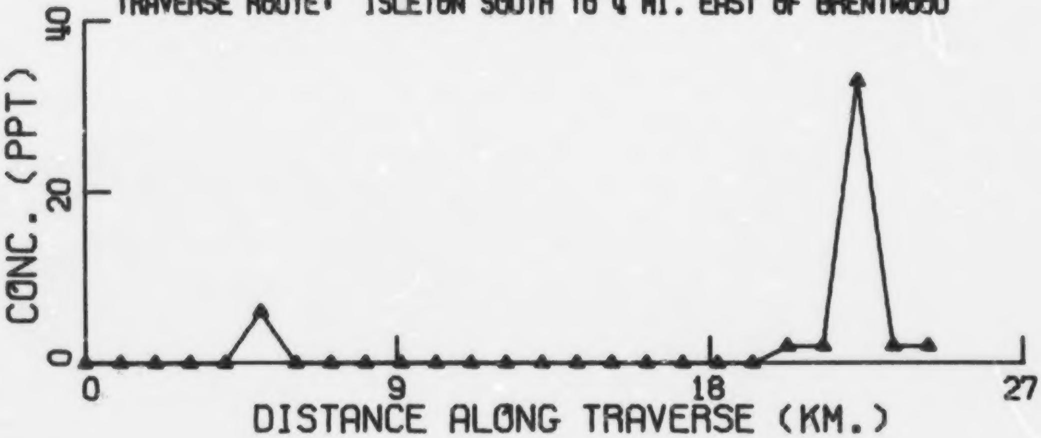
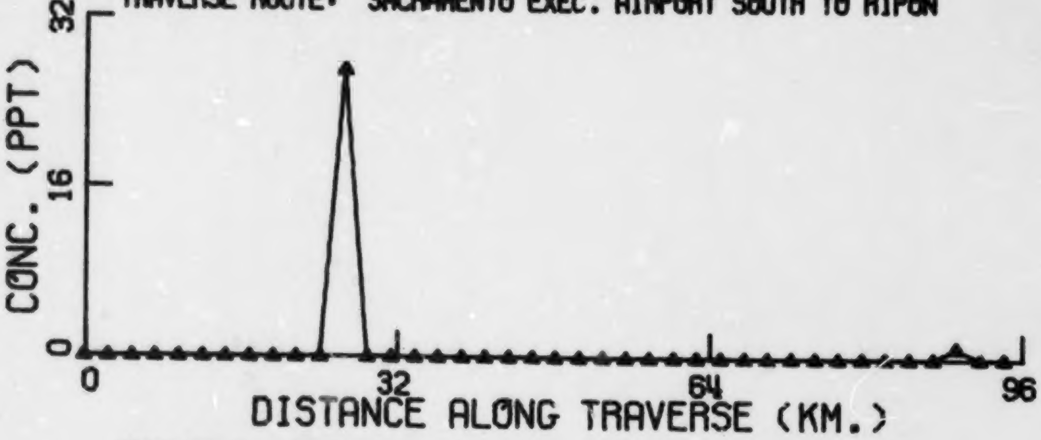


Figure 100.

TEST CAL6 TRAVERSE 10 ALT. (M) 183
DATE: 9/10/76 TIME: 1000-1039
TRAVERSE ROUTE: SACRAMENTO EXEC. AIRPORT SOUTH TO RIPON



TEST CAL6 TRAVERSE 12 ALT. (M) 183
DATE: 9/10/76 TIME: 1200-1239
TRAVERSE ROUTE: SACRAMENTO EXEC. AIRPORT SOUTH TO RIPON

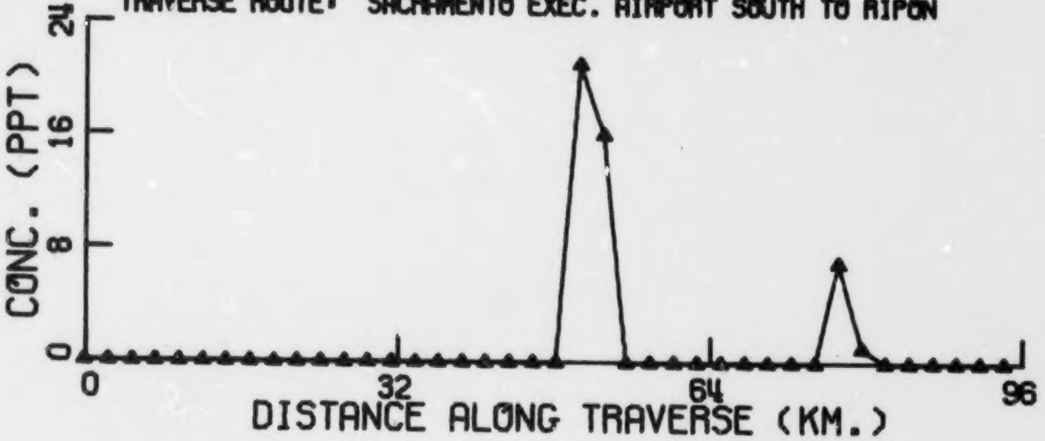
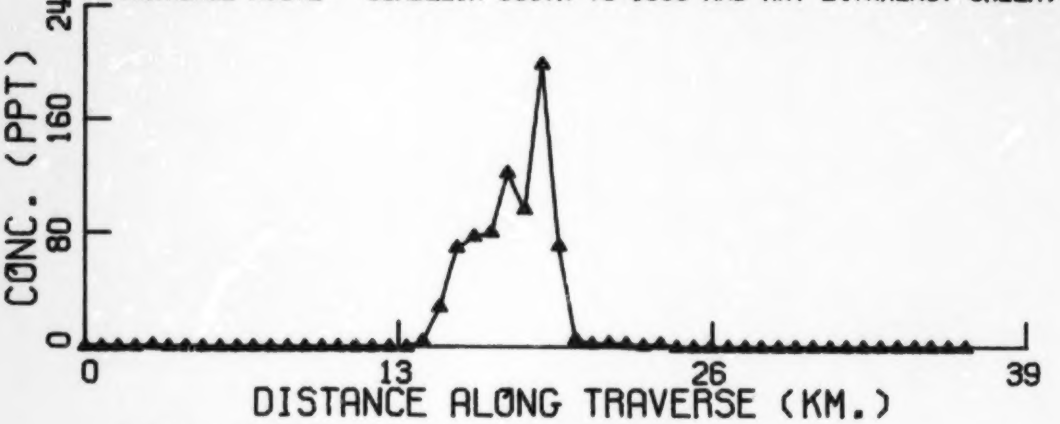
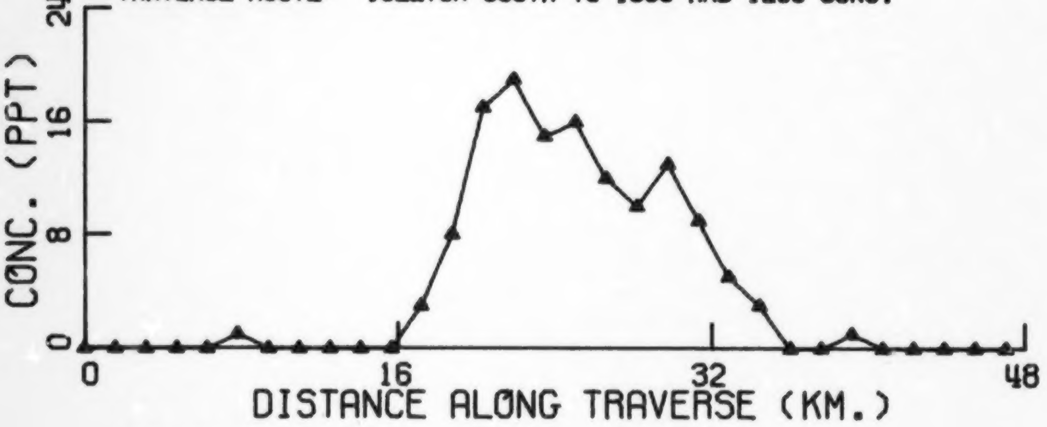


Figure 101.

TEST CAL7 TRAVERSE 6 ALT. (M) 183.
DATE: 9/13/76 TIME: 0945-0958
TRAVERSE ROUTE: CORDELIA SOUTH TO I680 AND HWY 24(WALNUT CREEK)



TEST CAL7 TRAVERSE 8 ALT. (M) 183.
DATE: 9/13/76 TIME: 1327-1343
TRAVERSE ROUTE: ISLETON SOUTH TO I580 AND I205 JUNC.



TEST CAL7 TRAVERSE 8 ALT. (M) 183.
DATE: 9/13/76 TIME: 1327-1343
TRAVERSE ROUTE: ISLETON SOUTH TO I580 AND I205 JUNC.

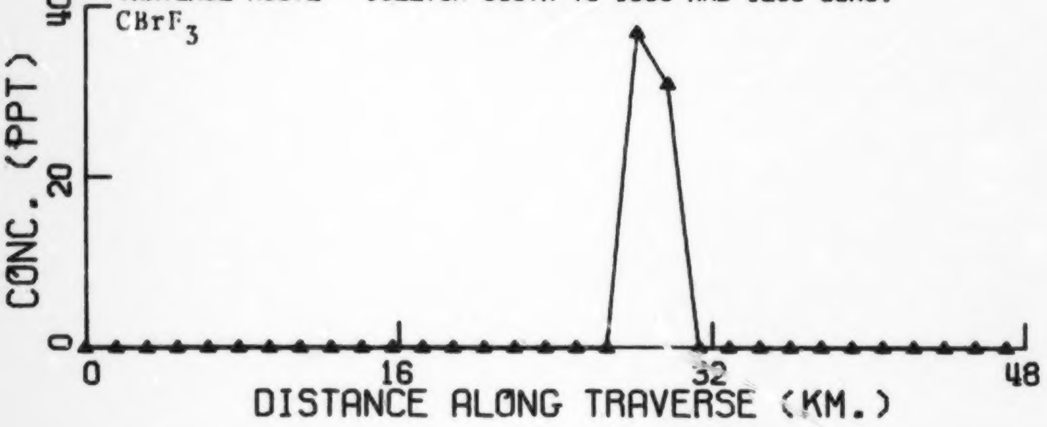
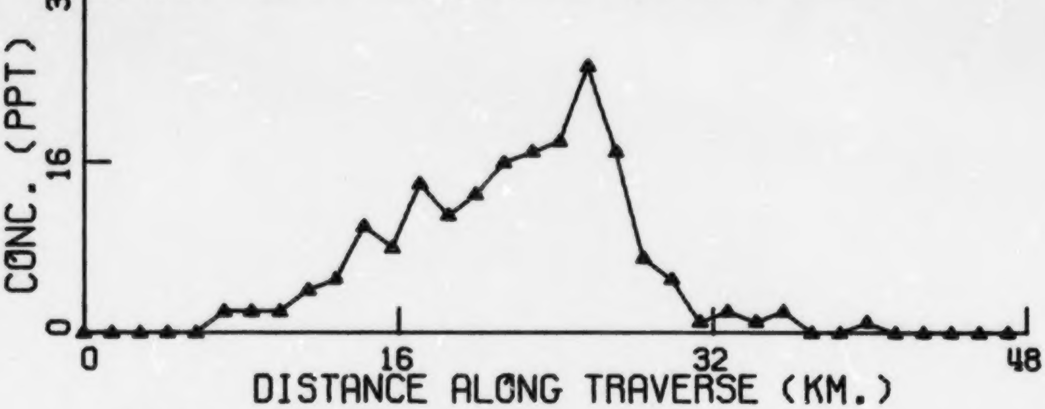
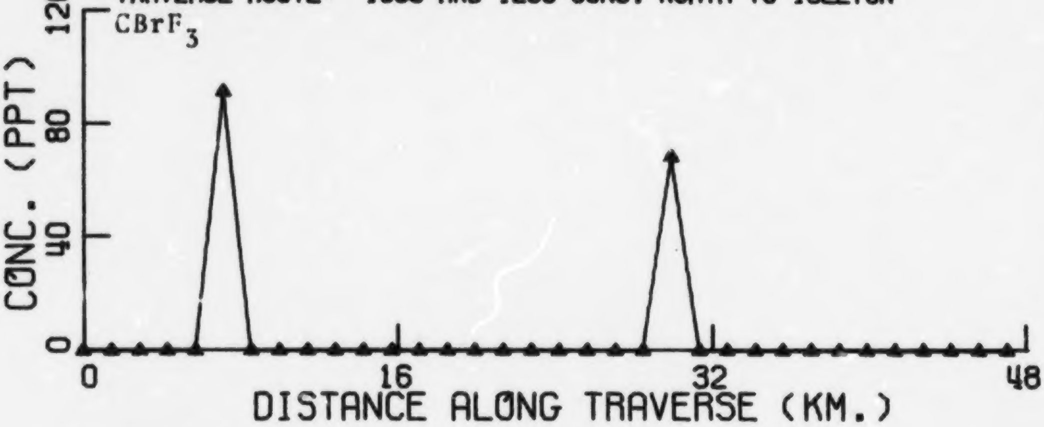


Figure 102.

TEST CAL7 TRAVERSE 9 ALT. (M) 305.
DATE: 9/13/76 TIME: 1348-1404
TRAVERSE ROUTE: I580 AND I205 JUNC. NORTH TO ISLETON



TEST CAL7 TRAVERSE 9 ALT. (M) 305.
DATE: 9/13/76 TIME: 1348-1404
TRAVERSE ROUTE: I580 AND I205 JUNC. NORTH TO ISLETON



TEST CAL7 TRAVERSE 11 ALT. (M) 427.
DATE: 9/13/76 TIME: 1428-1456
TRAVERSE ROUTE: VACA-DIXON AIRPORT S. TO ISLETON S. TO I580-I205

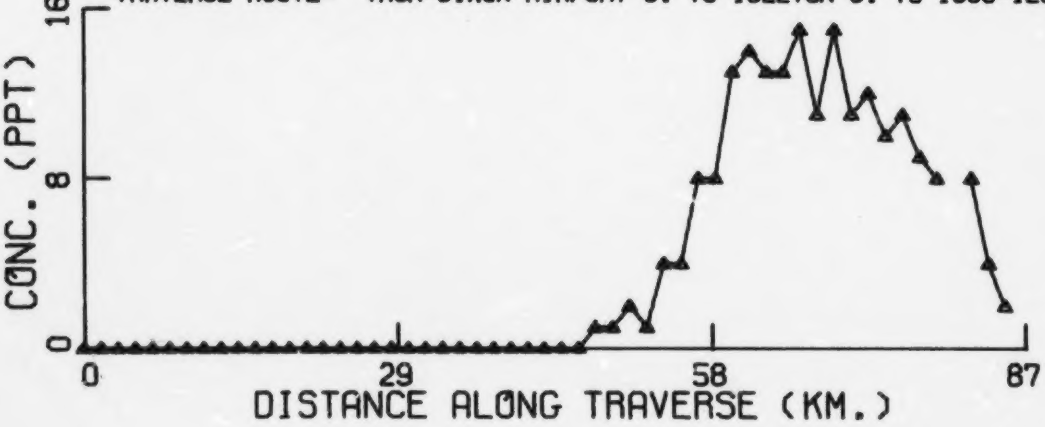


Figure 103.

TEST CAL7 TRAVERSE 12 ALT. (M) 457.
DATE: 9/13/76 TIME: 1759-1812
TRAVERSE ROUTE: LIVERMORE AIRPORT EAST TO I5 AND I205 JUNC.

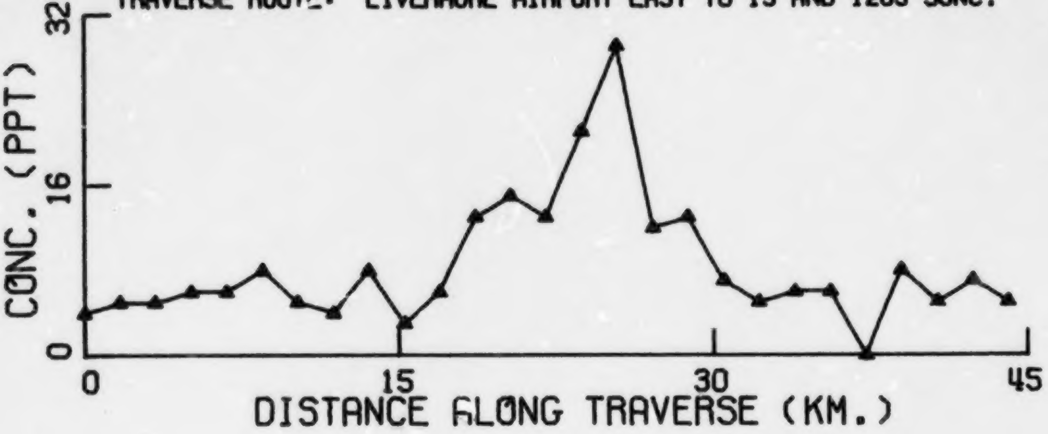
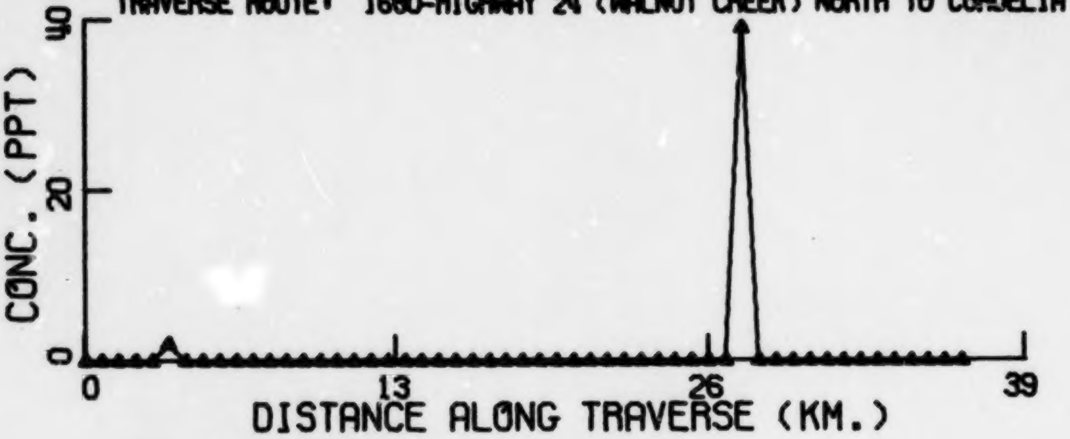
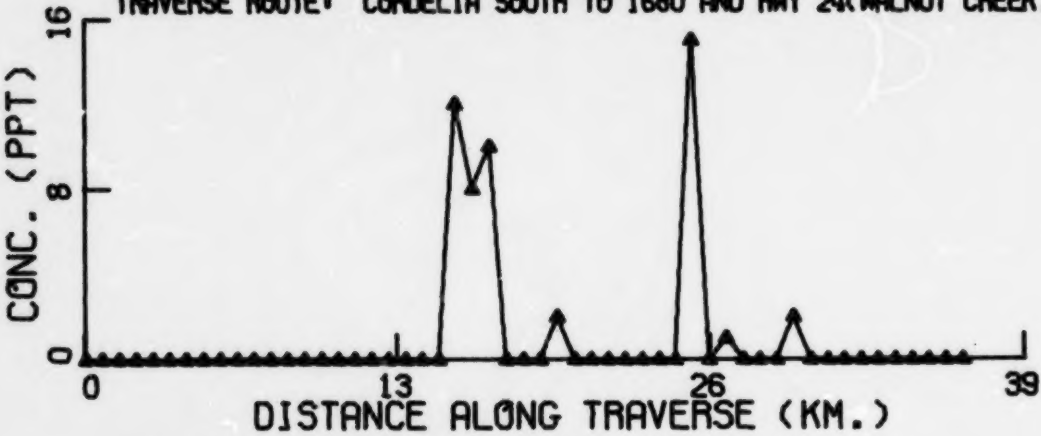


Figure 104.

TEST CAL8 TRAVERSE 1 ALT. (M) 366
DATE: 9/14/76 TIME: 0826-0839
TRAVERSE ROUTE: I680-HIGHWAY 24 (WALNUT CREEK) NORTH TO CORDELIA



TEST CAL8 TRAVERSE 2 ALT. (M) 274
DATE: 9/14/76 TIME: 0843-0856
TRAVERSE ROUTE: CORDELIA SOUTH TO I680 AND HWY 24(WALNUT CREEK)



TEST CAL8 TRAVERSE 3 ALT. (M) 183
DATE: 9/14/76 TIME: 0858-0911
TRAVERSE ROUTE: I680-HIGHWAY 24 (WALNUT CREEK) NORTH TO CORDELIA

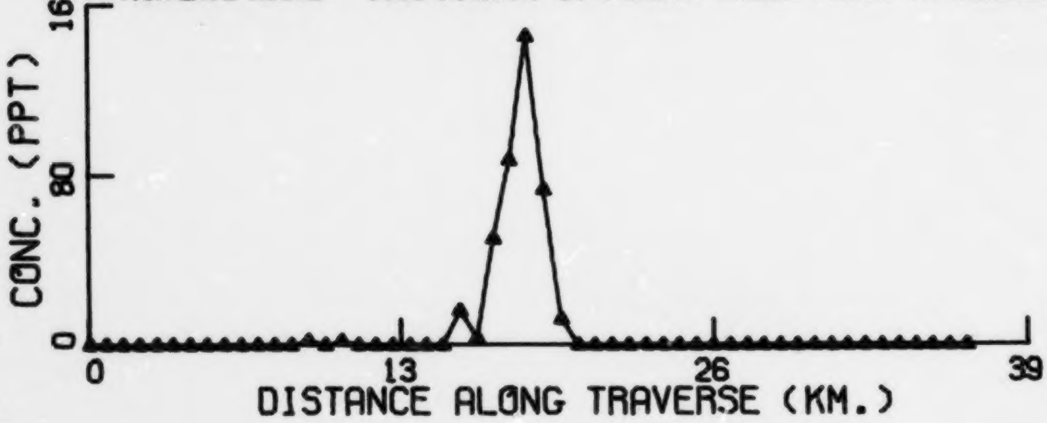
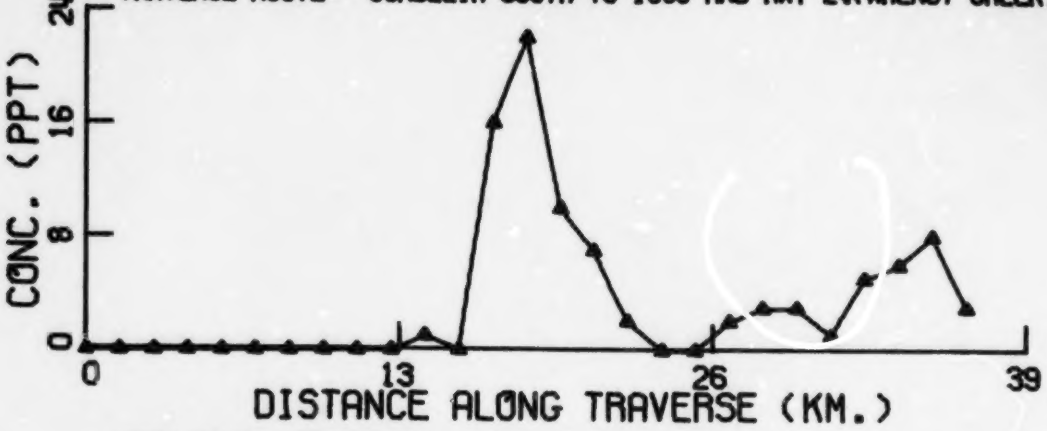
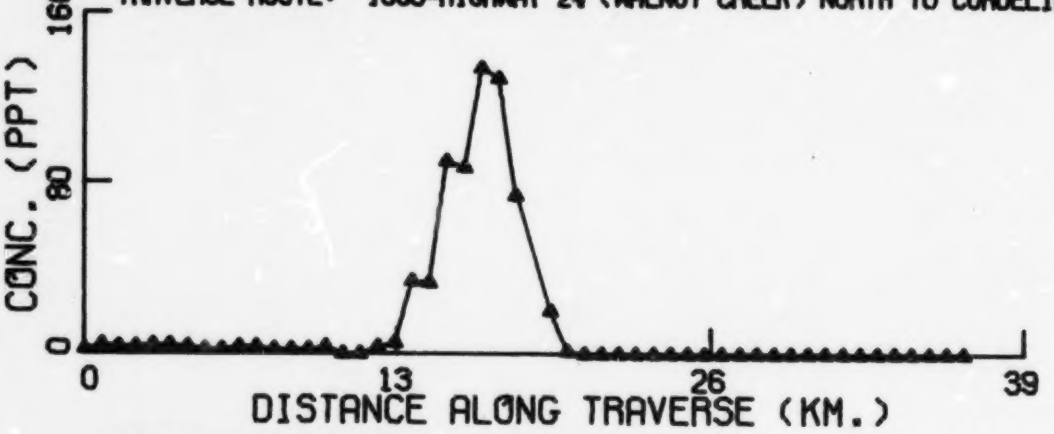


Figure 105.

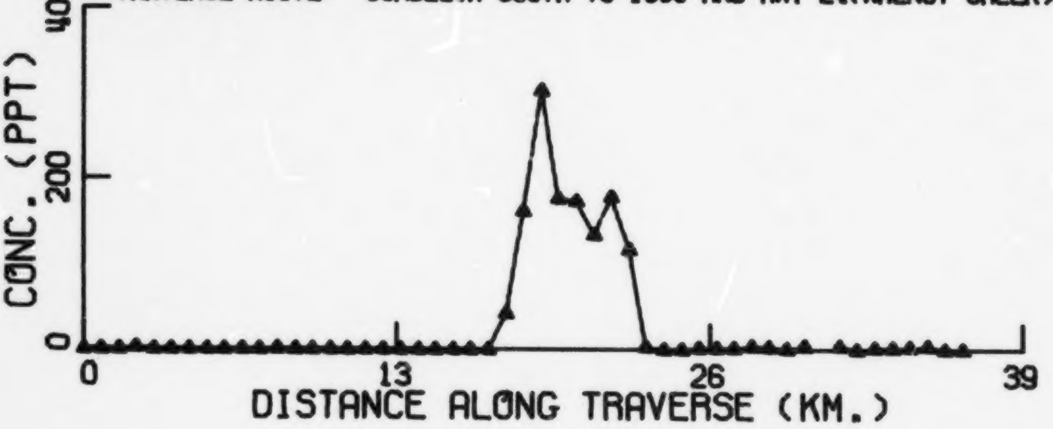
TEST CAL8 TRAVERSE 4 ALT. (M) 426
DATE: 9/14/76 TIME: 0942-0955
TRAVERSE ROUTE: CORDELIA SOUTH TO I680 AND HWY 24(WALNUT CREEK)



TEST CAL8 TRAVERSE 5 ALT. (M) 304
DATE: 9/14/76 TIME: 0959-1012
TRAVERSE ROUTE: I680-HIGHWAY 24 (WALNUT CREEK) NORTH TO CORDELIA



TEST CAL8 TRAVERSE 6 ALT. (M) 182
DATE: 9/14/76 TIME: 1016-1028
TRAVERSE ROUTE: CORDELIA SOUTH TO I680 AND HWY 24(WALNUT CREEK)



3.5 Airborne Spiral Tracer Data

The airborne spiral tracer data (for maximum concentrations greater than, or equal to, 10 ppt) are plotted as concentration versus height above sea level in the following figures. Spiral 6-1 was taken over Frank's Tract Recreation Area, directly east of the Dow site; spirals 7-1, 7-3, and 8-1 were taken 0.5 miles north of the Port Chicago Naval Magazine, east of the Carquinez Strait; and spiral 7-9 was taken over Stockton Metropolitan airport.

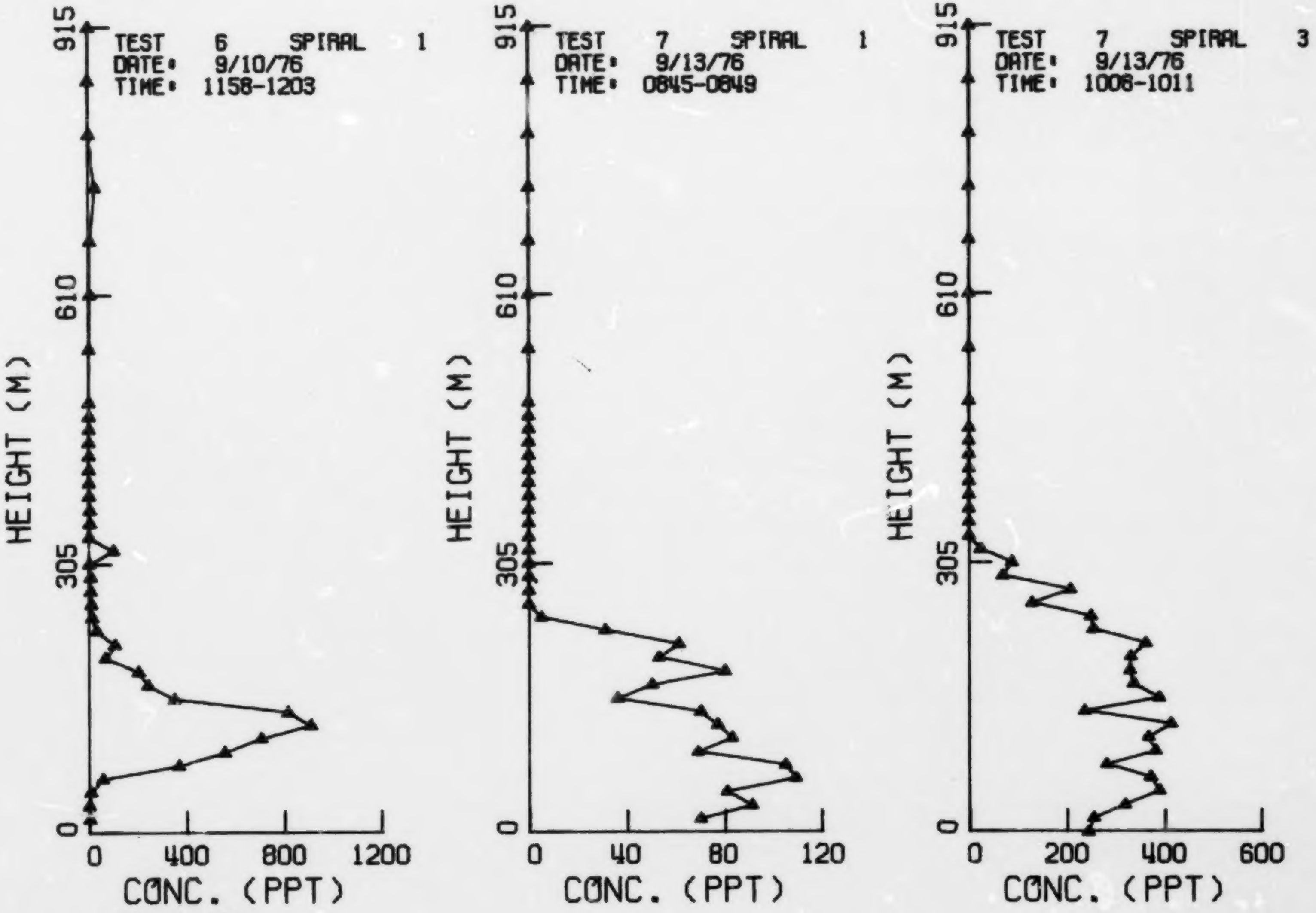

TEST 6 SPIRAL 1
DATE: 9/10/76
TIME: 1158-1203
HEIGHT (M)
915
610
305
0
0
400
800
1200
CONC. (PPT)
TEST 7 SPIRAL 1
DATE: 9/13/76
TIME: 0845-0849
HEIGHT (M)
915
610
305
0
0
40
80
120
CONC. (PPT)
TEST 7 SPIRAL 3
DATE: 9/13/76
TIME: 1006-1011
HEIGHT (M)
915
610
305
0
0
200
400
600
CONC. (PPT)

Figure 106.

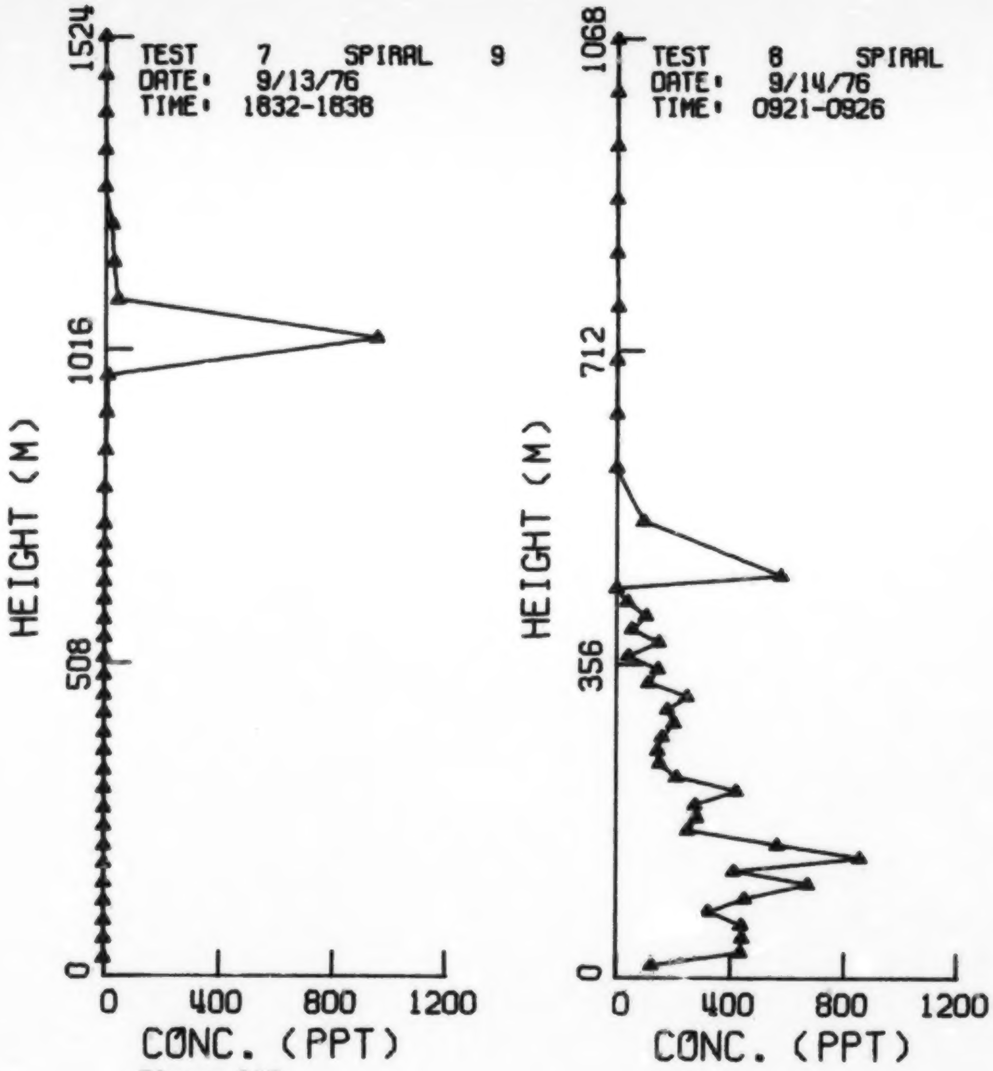

TEST 7 SPIRAL 9
DATE: 9/13/76
TIME: 1832-1838
HEIGHT (M)
1524
1016
508
0
0
400
800
1200
CONC. (PPT)
TEST 8 SPIRAL 1
DATE: 9/14/76
TIME: 0921-0926
HEIGHT (M)
1068
712
356
0
0
400
800
1200
CONC. (PPT)

Figure 107.

3.6 Automobile Traverse Best-fit Gaussian Curves

A best-fit Gaussian curve through the traverse data can be determined from the Gaussian equation:

$$C_f(y) = C_o \exp \left[-\tfrac{1}{2}\left(\frac{y - Y_o}{\sigma_y}\right)^2\right]$$

where $C_f(y)$ is the concentration as a function of distance along the traverse, C_o is the concentration at the plume centerline, Y_o is the distance along the traverse to the plume centerline, and σ_y is the crosswind standard deviation of the data. The function $C_f(y)$ represents a best-fit of the tracer data, $C(y)$, when the parameters are determined from

$$Y_o = \frac{\int_{-\infty}^{\infty} y\, C(y)\, dy}{\int_{-\infty}^{\infty} C(y)\, dy} \tag{1}$$

$$\sigma_y = \left[\frac{\int_{-\infty}^{\infty} y^2\, C(y)\, dy}{\int_{-\infty}^{\infty} C(y)\, dy} - {Y_o}^2\right]^{\frac{1}{2}} \tag{2}$$

and

$$C_o = \frac{\int_{-\infty}^{\infty} C(y)\, dy}{\sqrt{2\pi}\, \sigma_y} \tag{3}$$

The best-fit curves to the traverse tracer data are shown in the following figures. The integrals in (1), (2), and (3) were numerically integrated using Simpson's Rule (for details, see Appendix B of Volume I). Results of the best-fit procedure are given in Table 7.

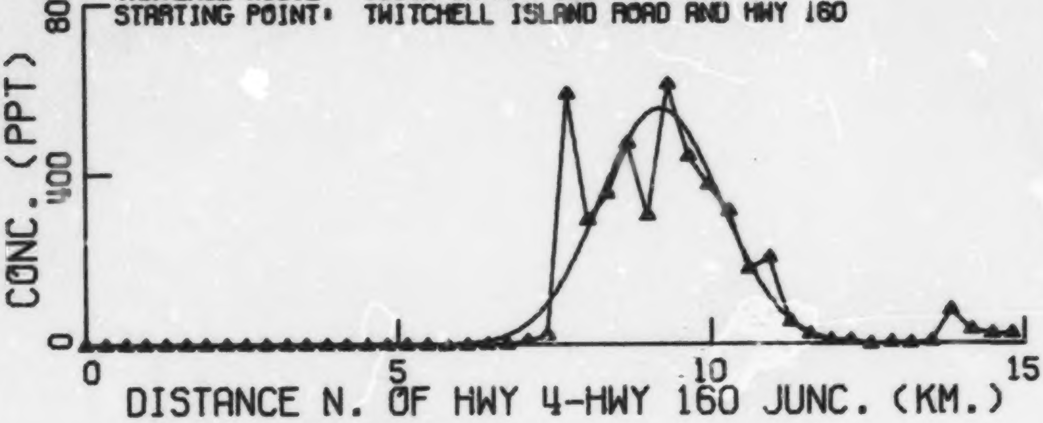
The integration of the horizontal crosswind traverse data provides a means of calculating a value of the vertical crosswind standard deviation, σ_z. If one assumes that the Gaussian plume model can be used to represent the data, then consideration of conservation of mass yields:

$$\int_{-\infty}^{\infty} C(y)\,dy \equiv C_{CWI} = \frac{Q}{\sqrt{2\pi}\,\sigma_z\, u}\left\{\exp\left[-\tfrac{1}{2}\left(\frac{Z+H}{\sigma_z}\right)^2\right] + \exp\left[-\tfrac{1}{2}\left(\frac{Z-H}{\sigma_z}\right)^2\right] + \sum_{n=1}^{4}\left(\exp\left[-\tfrac{1}{2}\left(\frac{z+H-2nL}{\sigma_z}\right)^2\right] + \exp\left[-\tfrac{1}{2}\left(\frac{z-H-2nL}{\sigma_z}\right)^2\right] + \exp\left[-\tfrac{1}{2}\left(\frac{z-H+2nL}{\sigma_z}\right)^2\right] + \exp\left[-\tfrac{1}{2}\left(\frac{z+H+2nL}{\sigma_z}\right)^2\right]\right)\right\}$$

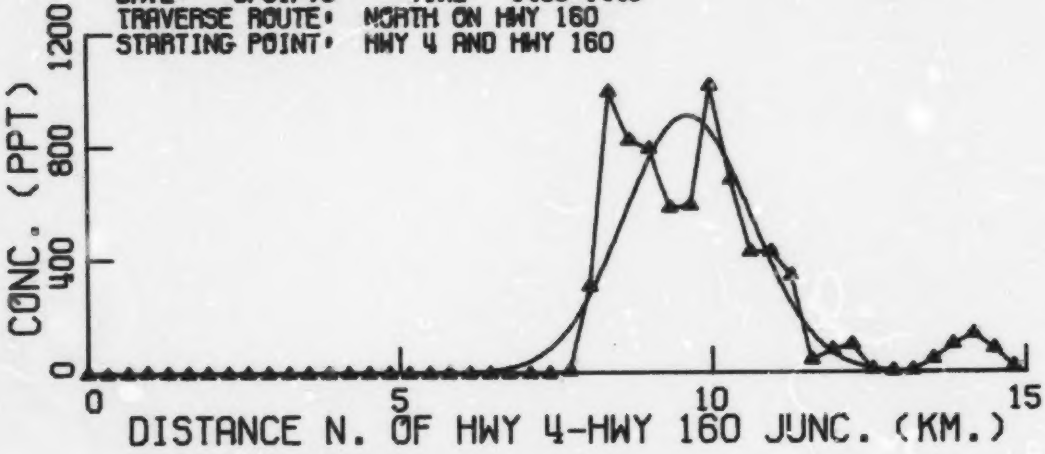
where C_{CWI} has been defined as the crosswind-integrated tracer concentration, and the summation terms have been used to represent reflection of the tracer from the top of the mixing layer, L. This equation can be solved for σ_z using a numerical iterative procedure. The value of σ_z thus obtained is an estimated number; the accuracy of the estimation is a function of the accuracy with which the average values of the wind speed and mixing height can be determined. The results of this analysis for the automobile traverse data are given in Table 7.

Figure 108.

TEST CAL1 TRAVERSE 2
DATE: 8/31/76 TIME: 1420-1433
TRAVERSE ROUTE: SOUTH ON HWY 160
STARTING POINT: TWITCHELL ISLAND ROAD AND HWY 160



TEST CAL1 TRAVERSE 3
DATE: 8/31/76 TIME: 1430-1445
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: HWY 4 AND HWY 160



TEST CAL1 TRAVERSE 4
DATE: 8/31/76 TIME: 1515-1527
TRAVERSE ROUTE: SOUTH ON HWY 160
STARTING POINT: TWITCHELL ISLAND ROAD AND HWY 160

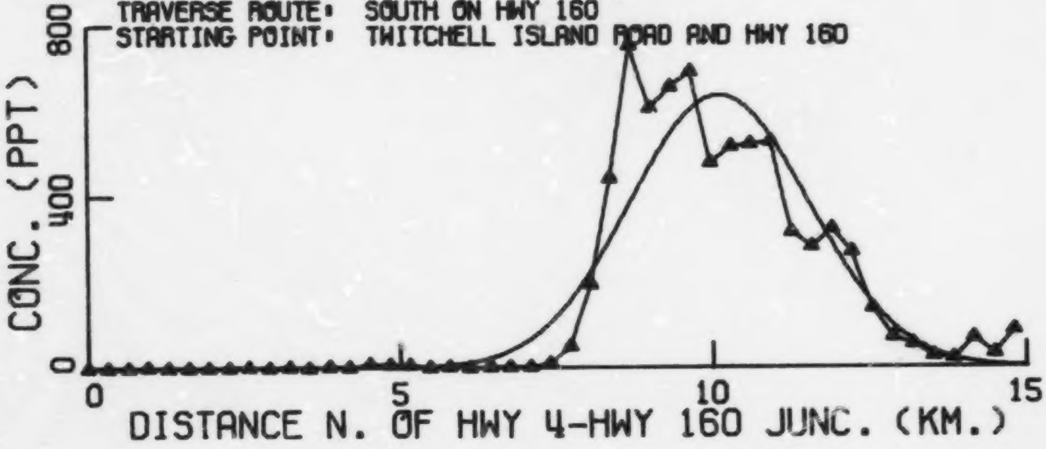
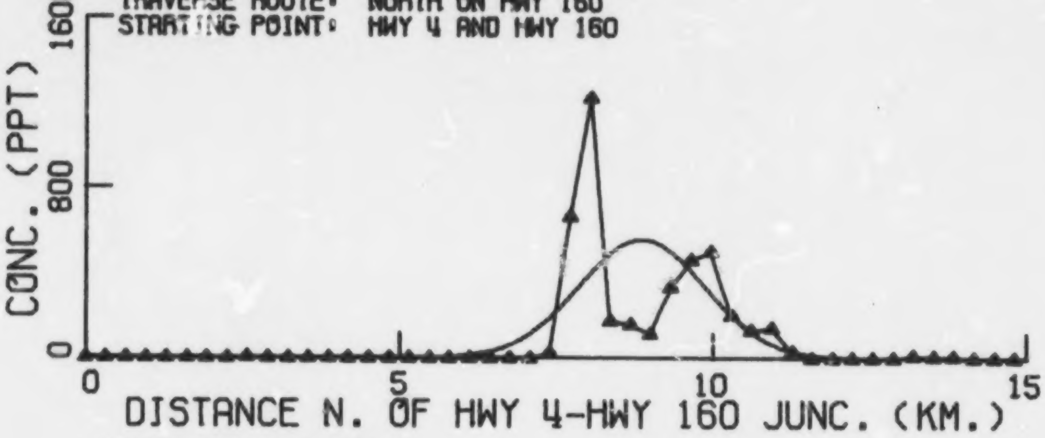


Figure 109.

TEST CAL1 TRAVERSE 6
DATE: 8/31/76 TIME: 1630-1641
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: HWY 4 AND HWY 160



TEST CAL1 TRAVERSE 7
DATE: 8/31/76 TIME: 1701-1753
TRAVERSE ROUTE: SOUTH ON HWY 99, WEST ON HWY 120, I205
STARTING POINT: BOESSOW ROAD (GALT) AND HWY 99

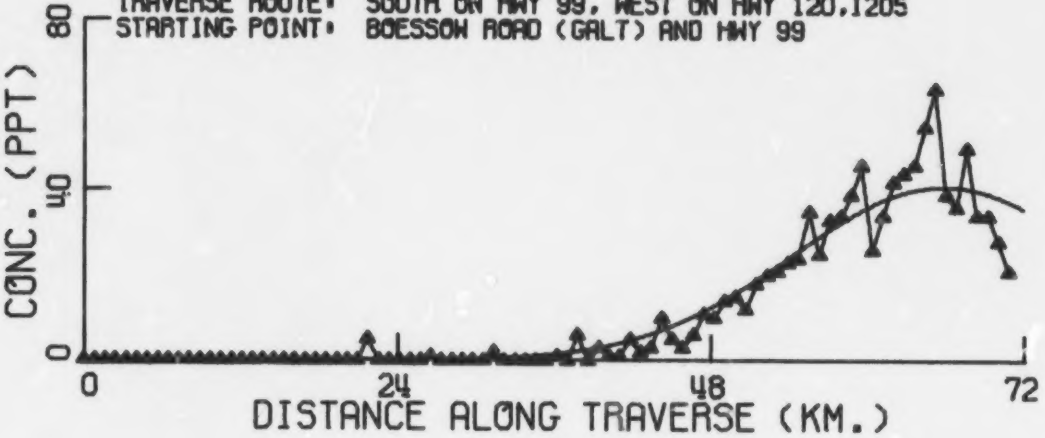


Figure 110.

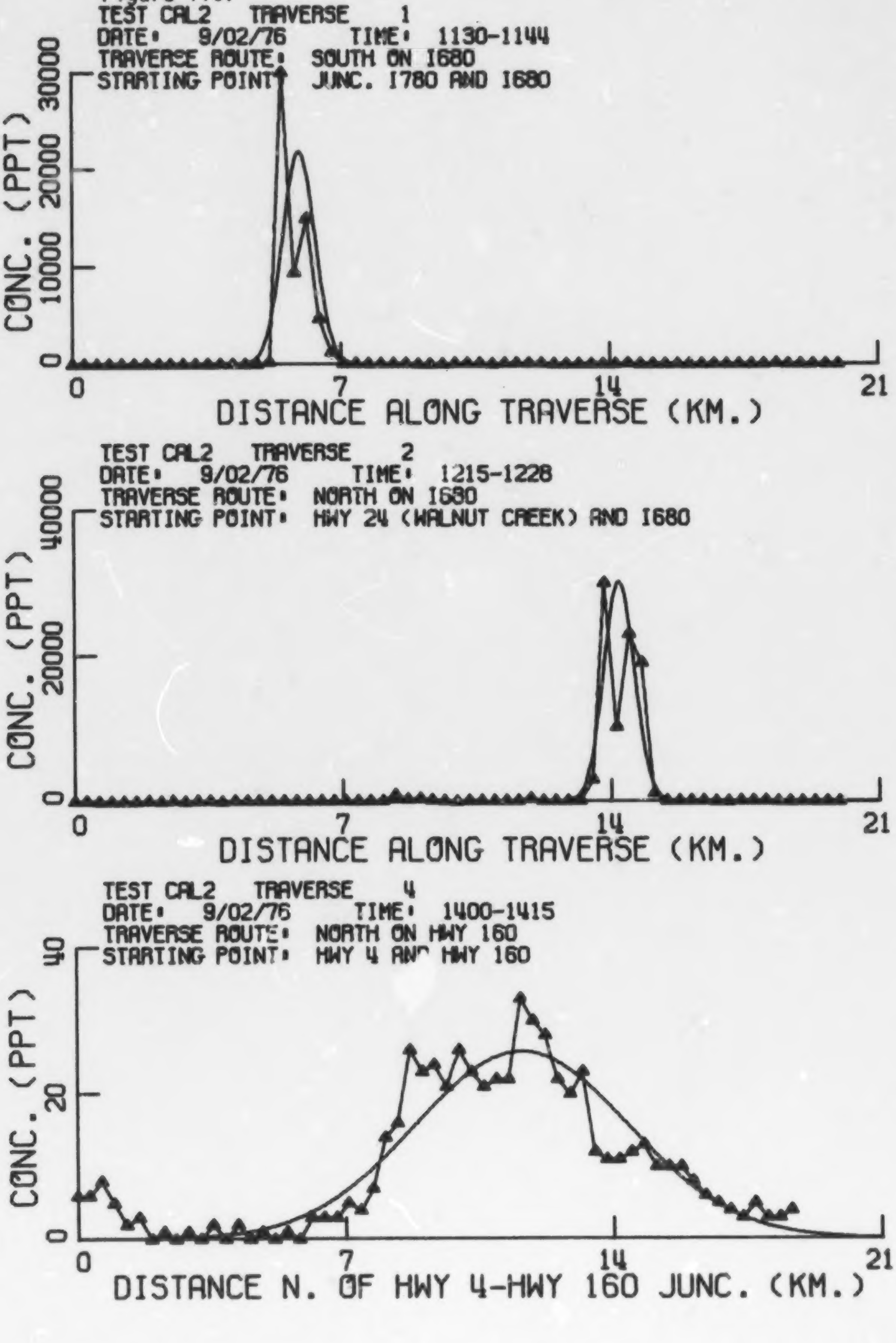
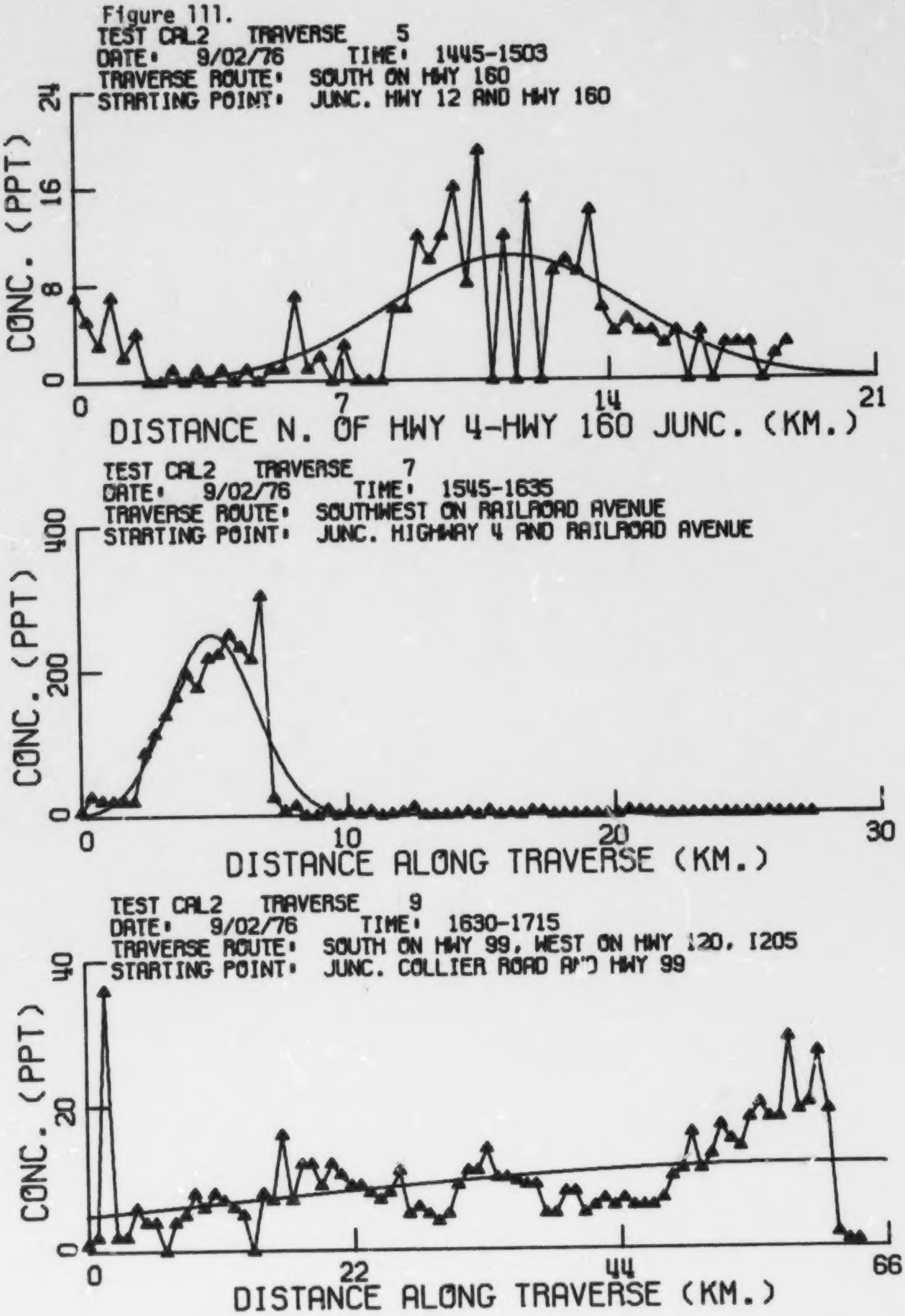

TEST CAL2 TRAVERSE 1
DATE: 9/02/76 TIME: 1130-1144
TRAVERSE ROUTE: SOUTH ON I680
STARTING POINT: JUNC. I780 AND I680
CONC. (PPT)
0
10000
20000
30000
0
7
14
21
DISTANCE ALONG TRAVERSE (KM.)
TEST CAL2 TRAVERSE 2
DATE: 9/02/76 TIME: 1215-1228
TRAVERSE ROUTE: NORTH ON I680
STARTING POINT: HWY 24 (WALNUT CREEK) AND I680
CONC. (PPT)
0
20000
40000
0
7
14
21
DISTANCE ALONG TRAVERSE (KM.)
TEST CAL2 TRAVERSE 4
DATE: 9/02/76 TIME: 1400-1415
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: HWY 4 AND HWY 160
CONC. (PPT)
0
20
40
0
7
14
21
DISTANCE N. OF HWY 4-HWY 160 JUNC. (KM.)

Figure 111.



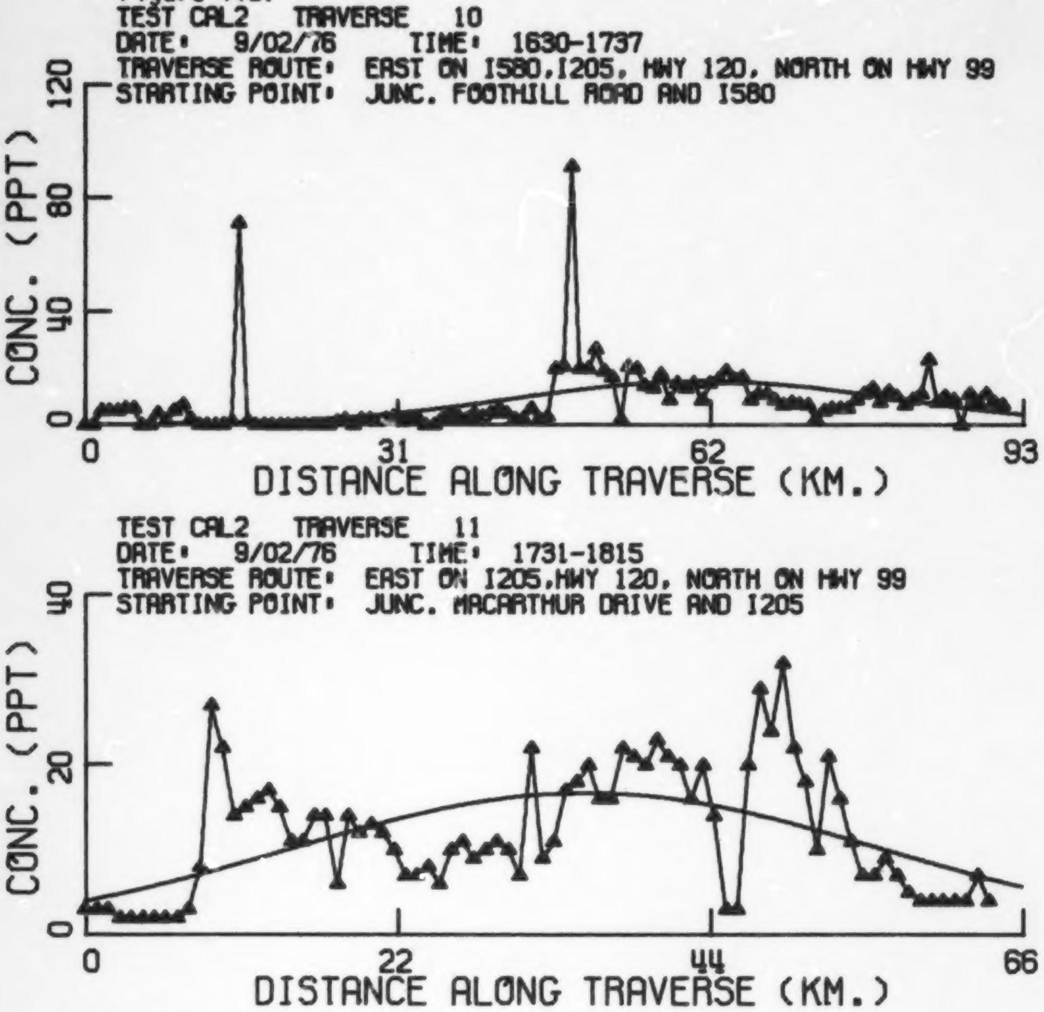
TEST CAL2 TRAVERSE 5
DATE: 9/02/76 TIME: 1445-1503
TRAVERSE ROUTE: SOUTH ON HWY 160
STARTING POINT: JUNC. HWY 12 AND HWY 160

TEST CAL2 TRAVERSE 7
DATE: 9/02/76 TIME: 1545-1635
TRAVERSE ROUTE: SOUTHWEST ON RAILROAD AVENUE
STARTING POINT: JUNC. HIGHWAY 4 AND RAILROAD AVENUE

TEST CAL2 TRAVERSE 9
DATE: 9/02/76 TIME: 1630-1715
TRAVERSE ROUTE: SOUTH ON HWY 99, WEST ON HWY 120, I205
STARTING POINT: JUNC. COLLIER ROAD AND HWY 99

CONC. (PPT)
0
20
40
0
22
44
66
DISTANCE ALONG TRAVERSE (KM.)

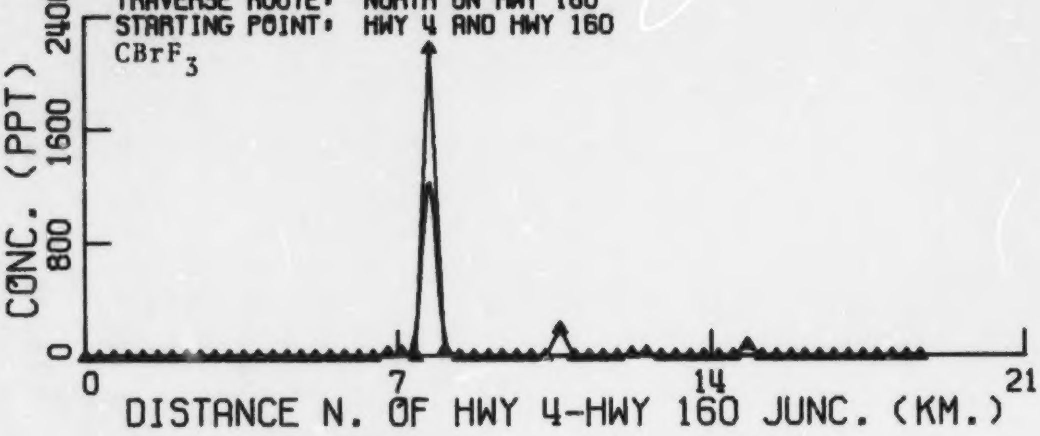
Figure 112.


TEST CAL2 TRAVERSE 10
DATE: 9/02/76 TIME: 1630-1737
TRAVERSE ROUTE: EAST ON I580, I205, HWY 120, NORTH ON HWY 99
STARTING POINT: JUNC. FOOTHILL ROAD AND I580

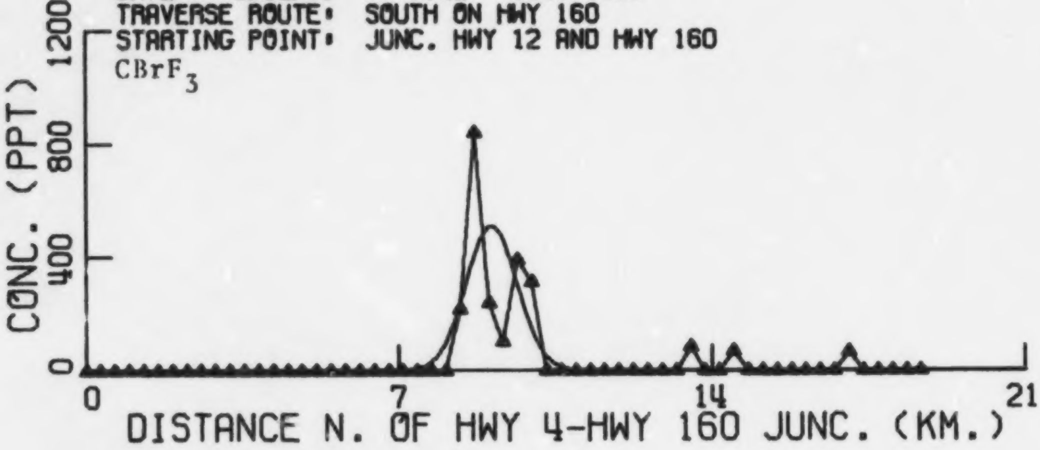
TEST CAL2 TRAVERSE 11
DATE: 9/02/76 TIME: 1731-1815
TRAVERSE ROUTE: EAST ON I205, HWY 120, NORTH ON HWY 99
STARTING POINT: JUNC. MACARTHUR DRIVE AND I205

Figure 113.

TEST CAL2 TRAVERSE 4
DATE: 9/02/76 TIME: 1400-1415
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: HWY 4 AND HWY 160



TEST CAL2 TRAVERSE 5
DATE: 9/02/76 TIME: 1445-1503
TRAVERSE ROUTE: SOUTH ON HWY 160
STARTING POINT: JUNC. HWY 12 AND HWY 160



TEST CAL2 TRAVERSE 10
DATE: 9/02/76 TIME: 1630-1737
TRAVERSE ROUTE: EAST ON I580, I205, HWY 120, NORTH ON HWY 99
STARTING POINT: JUNC. FOOTHILL ROAD AND I580

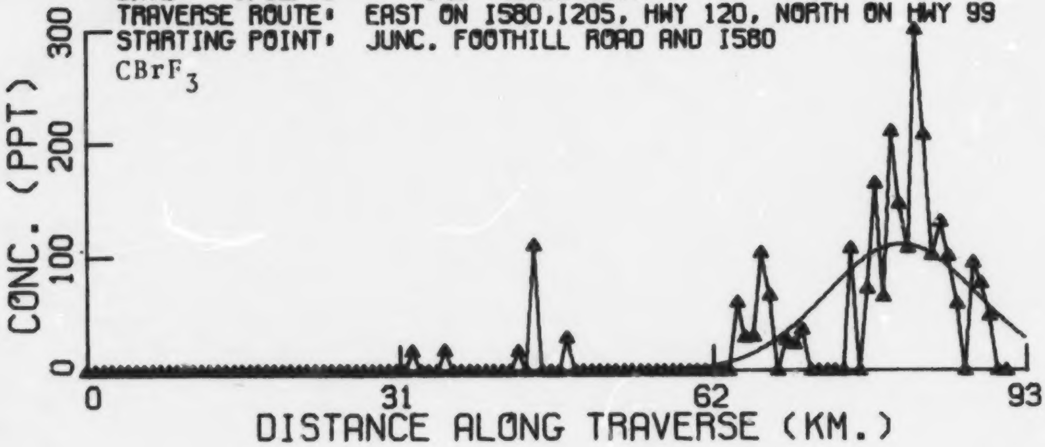
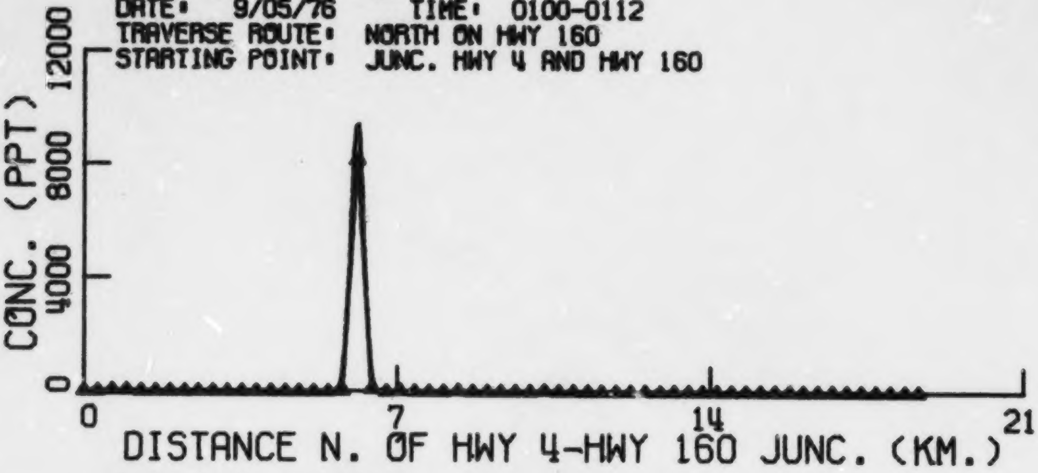
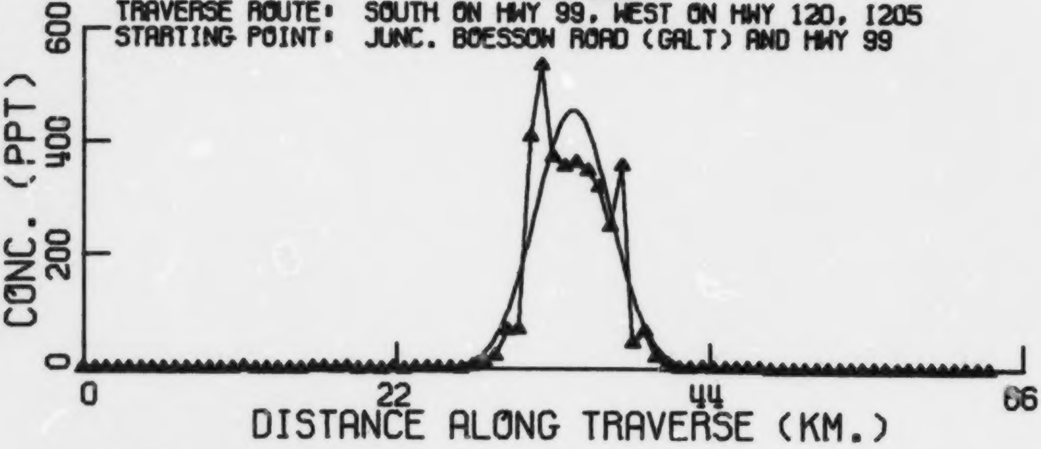


Figure 114.

TEST CAL3 TRAVERSE 1
DATE: 9/05/76 TIME: 0100-0112
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: JUNC. HWY 4 AND HWY 160



TEST CAL3 TRAVERSE 3
DATE: 9/05/76 TIME: 0213-0259
TRAVERSE ROUTE: SOUTH ON HWY 99, WEST ON HWY 120, I205
STARTING POINT: JUNC. BOESSOW ROAD (GALT) AND HWY 99



TEST CAL3 TRAVERSE 4
DATE: 9/05/76 TIME: 0240-0300
TRAVERSE ROUTE: SOUTH ON HWY 160
STARTING POINT: EMMATON ON HWY 160

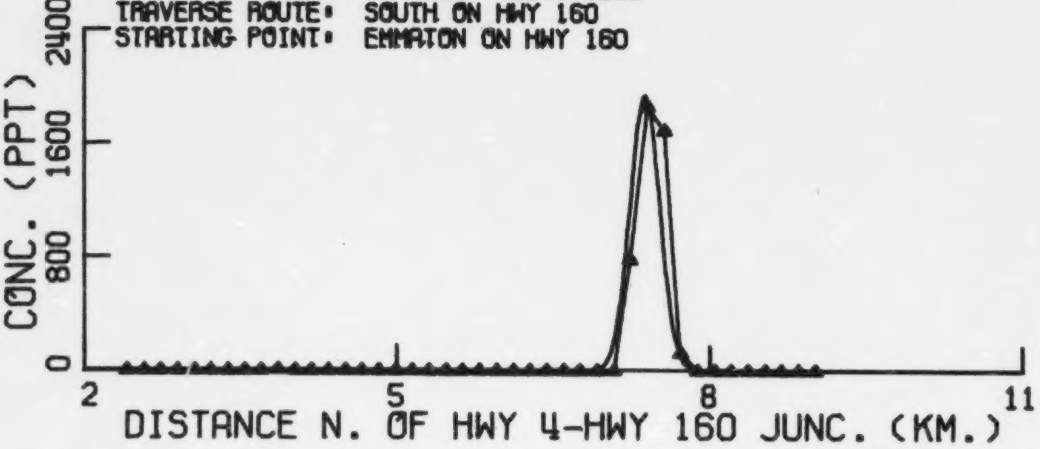
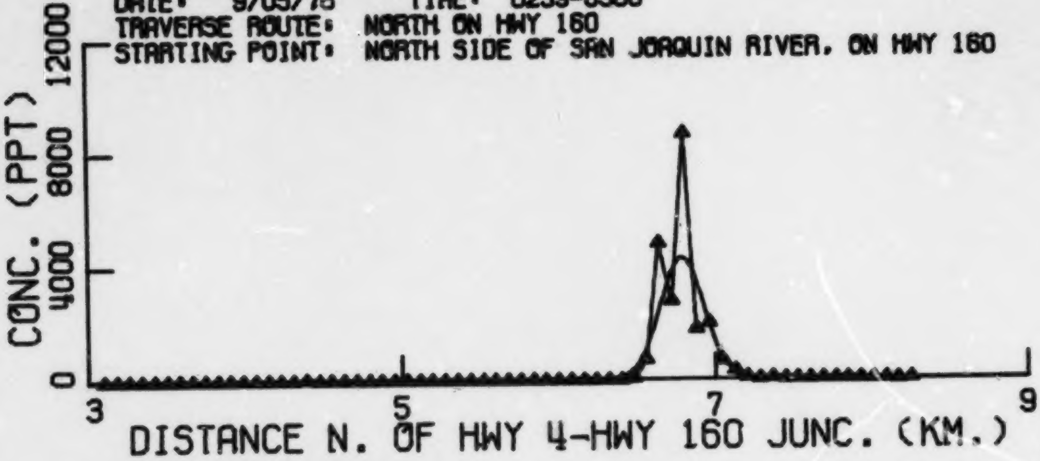
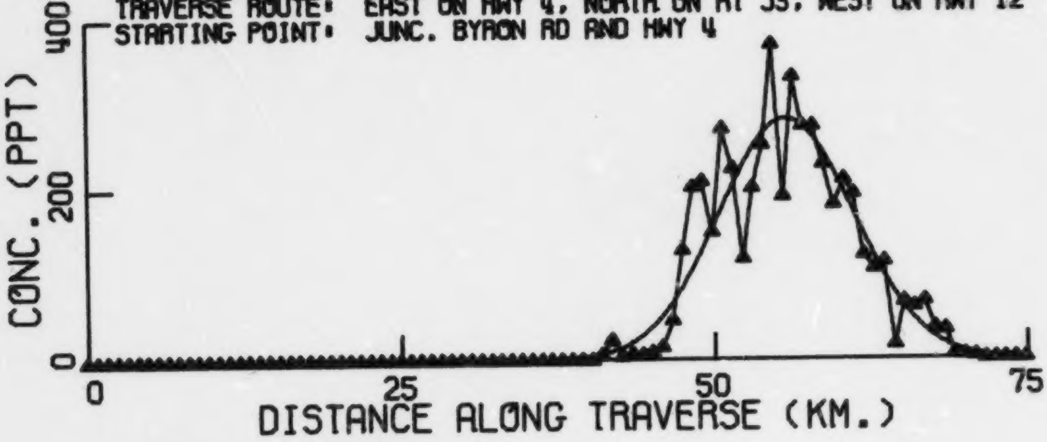


Figure 115.

TEST CAL3 TRAVERSE 6
DATE: 9/05/76 TIME: 0259-0306
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: NORTH SIDE OF SAN JOAQUIN RIVER, ON HWY 160



TEST CAL3 TRAVERSE 8
DATE: 9/05/76 TIME: 0414-0545
TRAVERSE ROUTE: EAST ON HWY 4, NORTH ON RT J3, WEST ON HWY 12
STARTING POINT: JUNC. BYRON RD AND HWY 4



TEST CAL3 TRAVERSE 9
DATE: 9/05/76 TIME: 0430-0445
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: JUNC. HWY 4 AND HWY 160

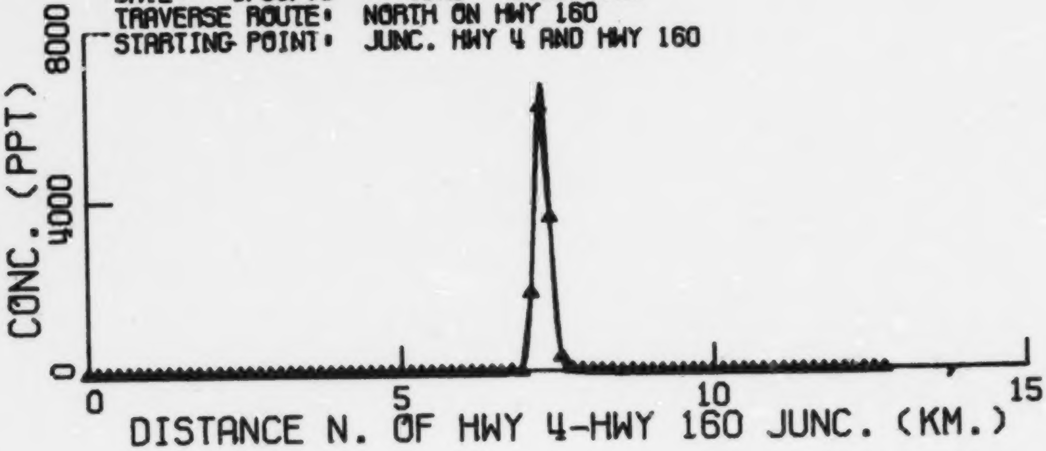
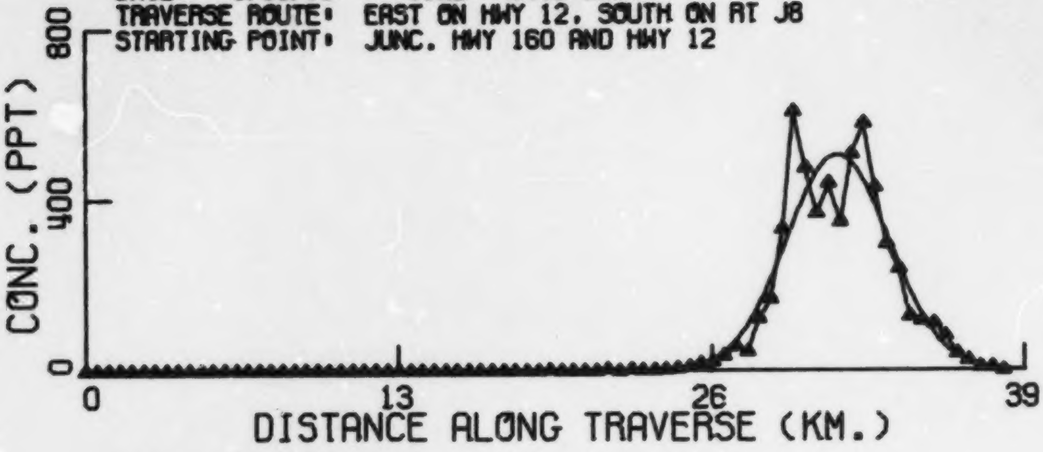
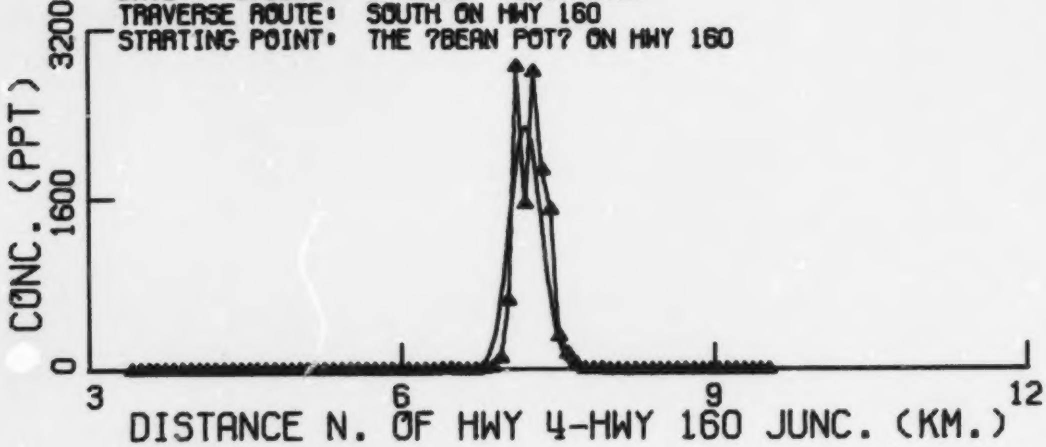


Figure 116.

TEST CAL3 TRAVERSE 10
DATE: 9/05/76 TIME: 0432-0517
TRAVERSE ROUTE: EAST ON HWY 12, SOUTH ON RT J8
STARTING POINT: JUNC. HWY 160 AND HWY 12



TEST CAL3 TRAVERSE 11
DATE: 9/05/76 TIME: 0441-0450
TRAVERSE ROUTE: SOUTH ON HWY 160
STARTING POINT: THE ?BEAN POT? ON HWY 160



TEST CAL3 TRAVERSE 12
DATE: 9/05/76 TIME: 0502-0511
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: NORTH SIDE OF SAN JOAQUIN RIVER ON HWY 160

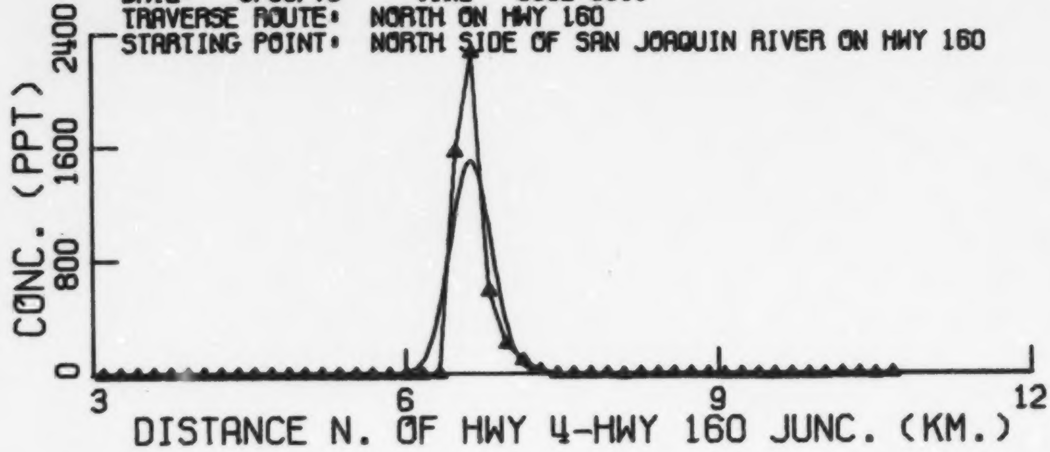
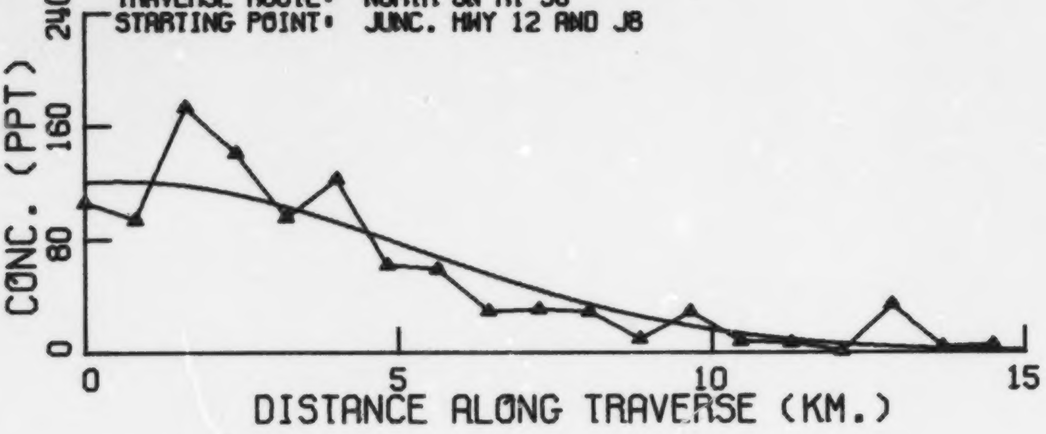


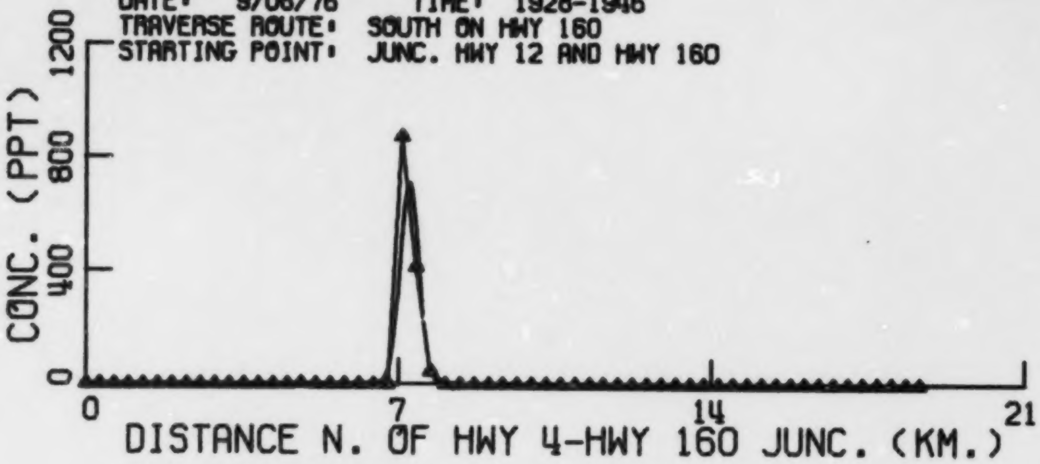
Figure 117.



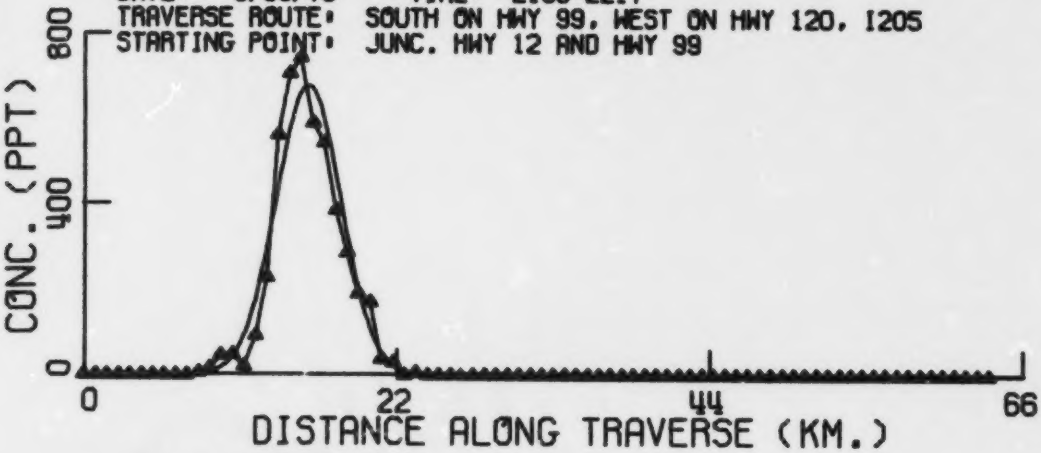
TEST CAL3 TRAVERSE 14
DATE: 9/05/76 TIME: 0637-0647
TRAVERSE ROUTE: NORTH ON RT J8
STARTING POINT: JUNC. HWY 12 AND J8

Figure 118.

TEST CAL4 TRAVERSE 1
DATE: 9/06/76 TIME: 1928-1946
TRAVERSE ROUTE: SOUTH ON HWY 160
STARTING POINT: JUNC. HWY 12 AND HWY 160



TEST CAL4 TRAVERSE 2
DATE: 9/06/76 TIME: 2130-2217
TRAVERSE ROUTE: SOUTH ON HWY 99, WEST ON HWY 120, I205
STARTING POINT: JUNC. HWY 12 AND HWY 99



TEST CAL4 TRAVERSE 3
DATE: 9/06/76 TIME: 2132-2140
TRAVERSE ROUTE: SOUTH ON HWY 160
STARTING POINT: THE ?BEAN POT? ON HWY 160

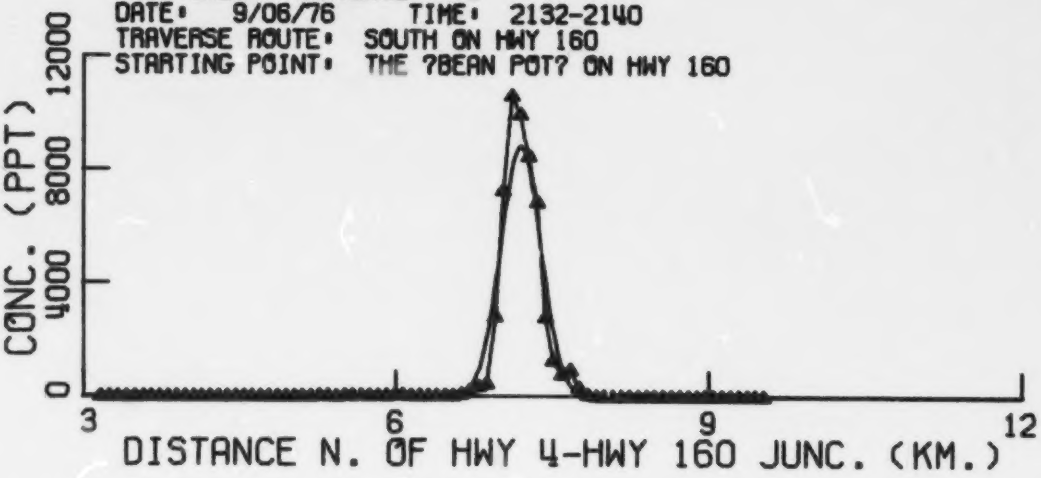
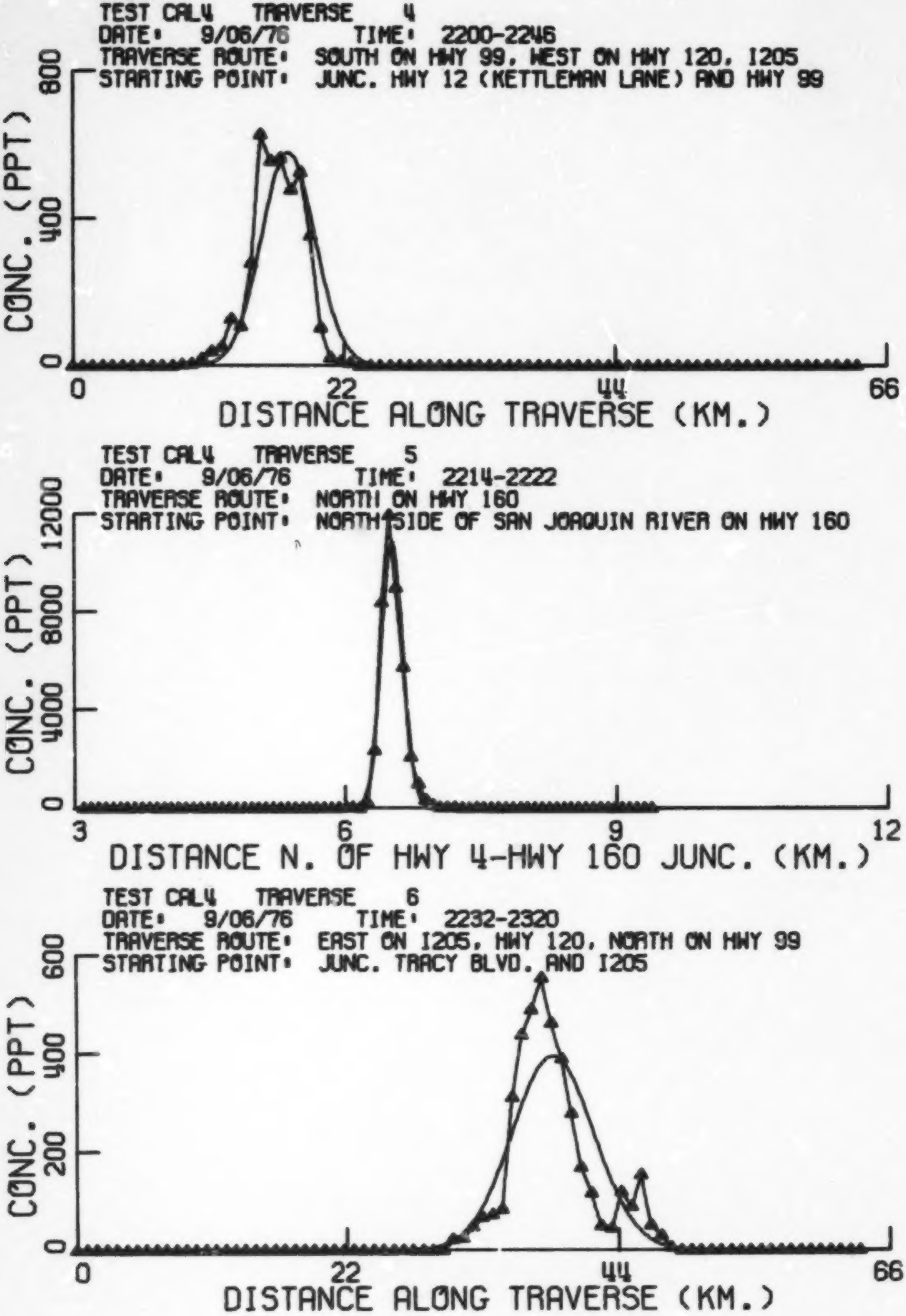


Figure 119.



TEST CAL4 TRAVERSE 4
DATE: 9/06/76 TIME: 2200-2246
TRAVERSE ROUTE: SOUTH ON HWY 99, WEST ON HWY 120, I205
STARTING POINT: JUNC. HWY 12 (KETTLEMAN LANE) AND HWY 99

TEST CAL4 TRAVERSE 5
DATE: 9/06/76 TIME: 2214-2222
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: NORTH SIDE OF SAN JOAQUIN RIVER ON HWY 160

TEST CAL4 TRAVERSE 6
DATE: 9/06/76 TIME: 2232-2320
TRAVERSE ROUTE: EAST ON I205, HWY 120, NORTH ON HWY 99
STARTING POINT: JUNC. TRACY BLVD. AND I205

CONC. (PPT)
600
400
200
0
0
22
44
66
DISTANCE ALONG TRAVERSE (KM.)

Figure 120.

TEST CAL4 TRAVERSE 7
DATE: 9/06/76 TIME: 2315-2400
TRAVERSE ROUTE: EAST ON I205, HWY 120, NORTH ON HWY 99
STARTING POINT: 1.4 MI. E. OF JUNC. PATTERSON PASS RD. AND I205

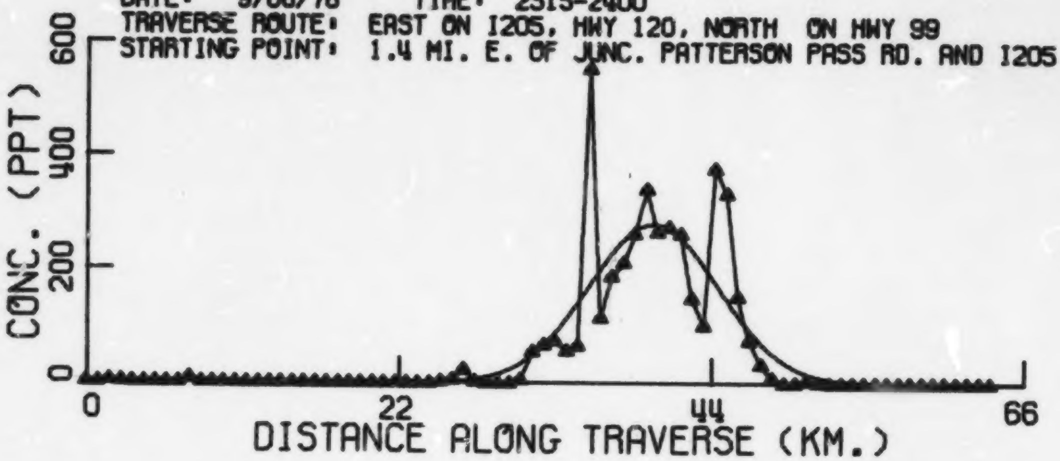
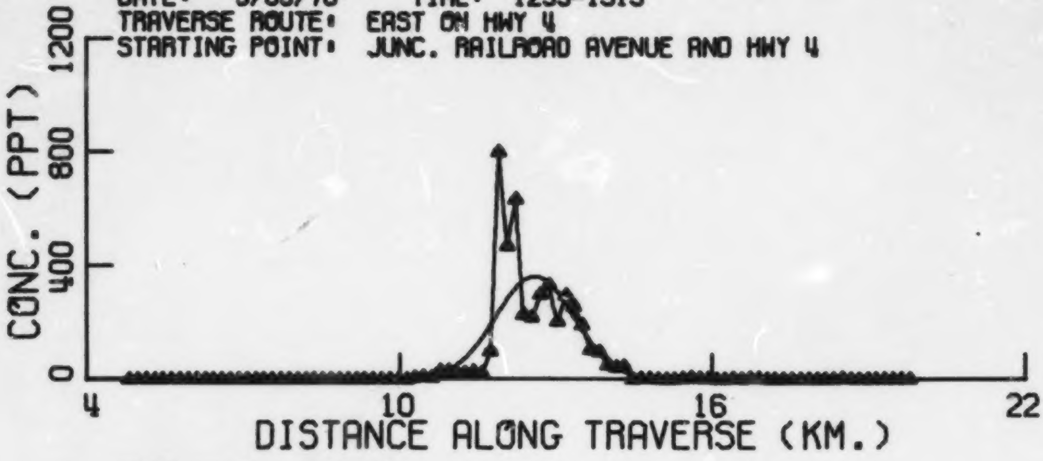
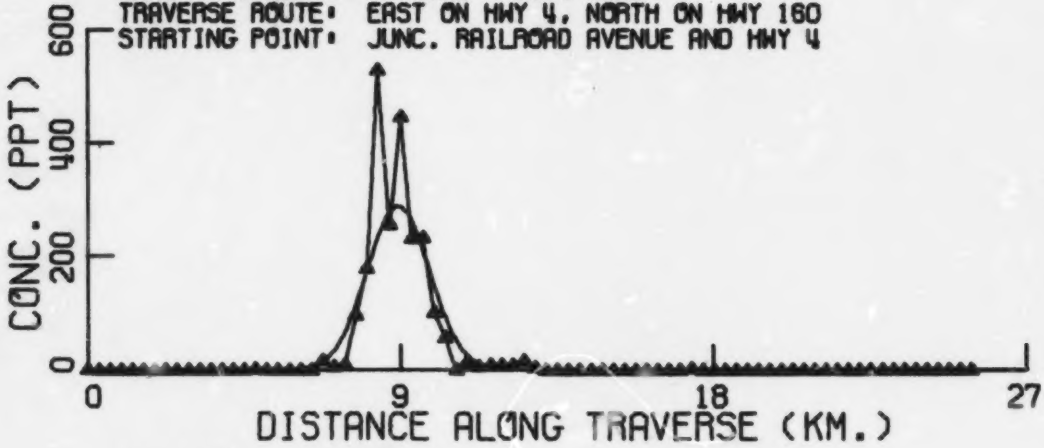


Figure 121.

TEST CAL5 TRAVERSE 1
DATE: 9/09/76 TIME: 1255-1315
TRAVERSE ROUTE: EAST ON HWY 4
STARTING POINT: JUNC. RAILROAD AVENUE AND HWY 4



TEST CAL5 TRAVERSE 2
DATE: 9/09/76 TIME: 1314-1330
TRAVERSE ROUTE: EAST ON HWY 4, NORTH ON HWY 160
STARTING POINT: JUNC. RAILROAD AVENUE AND HWY 4



TEST CAL5 TRAVERSE 4
DATE: 9/09/76 TIME: 1351-1405
TRAVERSE ROUTE: EAST ON BALFOUR ROAD
STARTING POINT: JUNC. DEER VALLEY RD AND BALFOUR RD

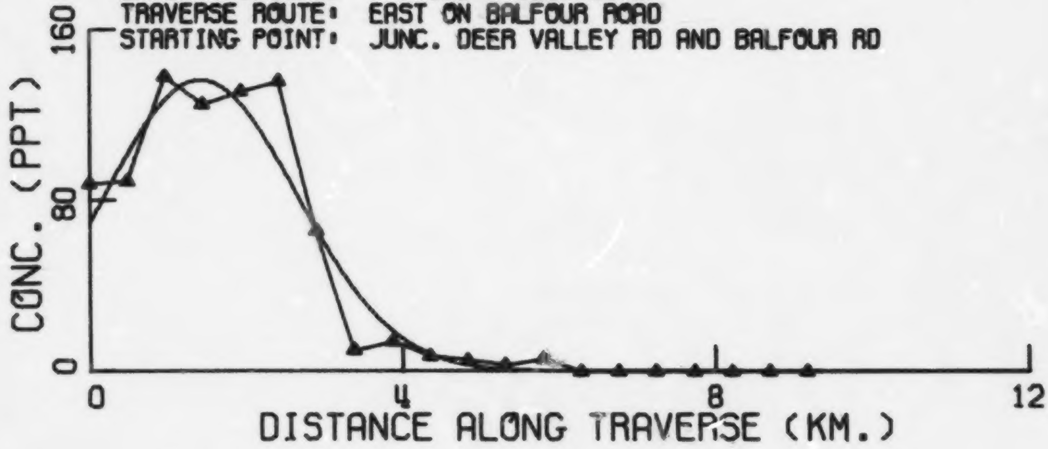
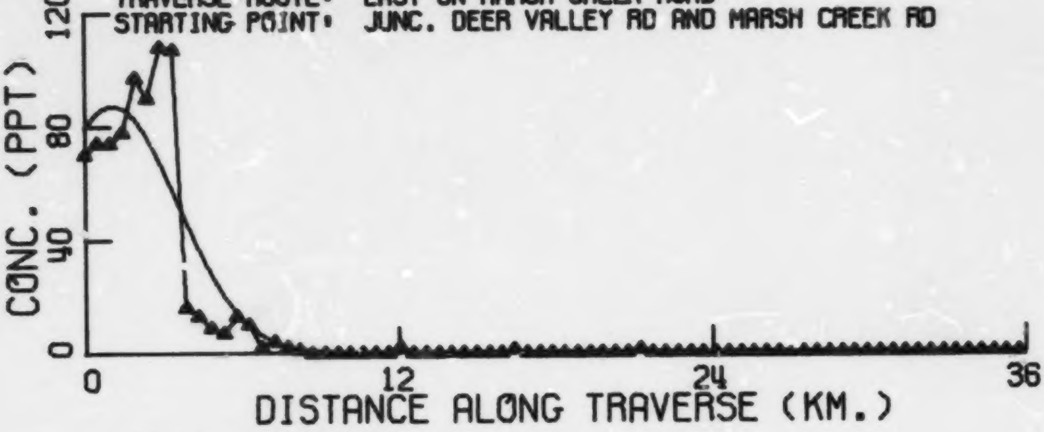
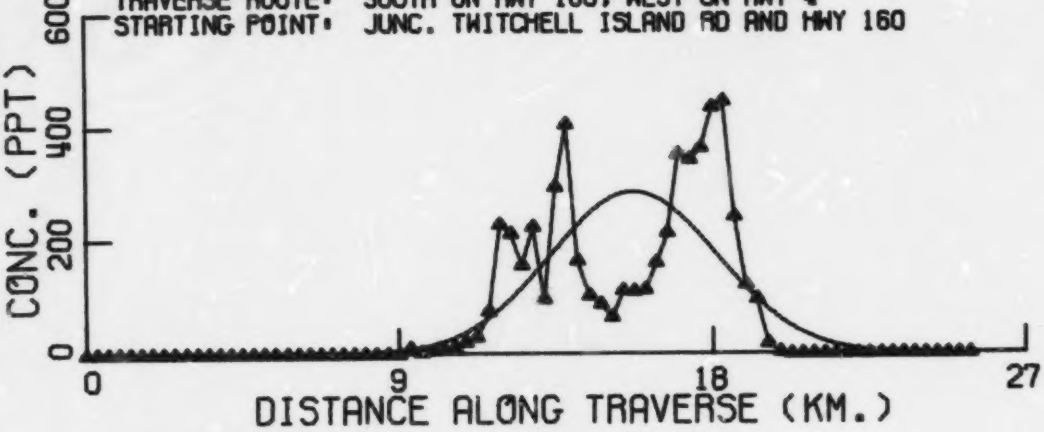


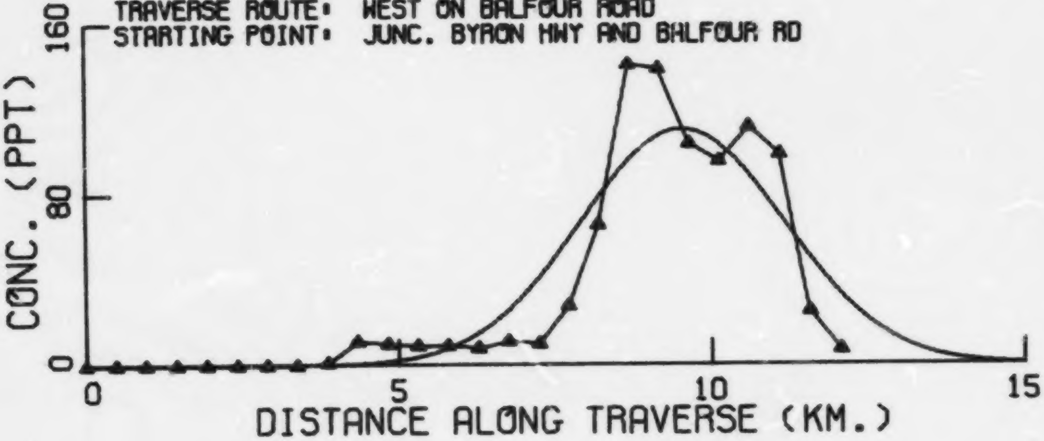
Figure 122.



TEST CAL5 TRAVERSE 5
DATE: 9/09/76 TIME: 1356-1428
TRAVERSE ROUTE: EAST ON MARSH CREEK ROAD
STARTING POINT: JUNC. DEER VALLEY RD AND MARSH CREEK RD



TEST CAL5 TRAVERSE 6
DATE: 9/09/76 TIME: 1359-1416
TRAVERSE ROUTE: SOUTH ON HWY 160, WEST ON HWY 4
STARTING POINT: JUNC. TWITCHELL ISLAND RD AND HWY 160



TEST CAL5 TRAVERSE 7
DATE: 9/09/76 TIME: 1413-1426
TRAVERSE ROUTE: WEST ON BALFOUR ROAD
STARTING POINT: JUNC. BYRON HWY AND BALFOUR RD

Figure 123.
TEST CAL5 TRAVERSE 8
DATE: 9/09/76 TIME: 1436-1450
TRAVERSE ROUTE: EAST ON BALFOUR ROAD
STARTING POINT: JUNC. DEER VALLEY RD AND BALFOUR RD

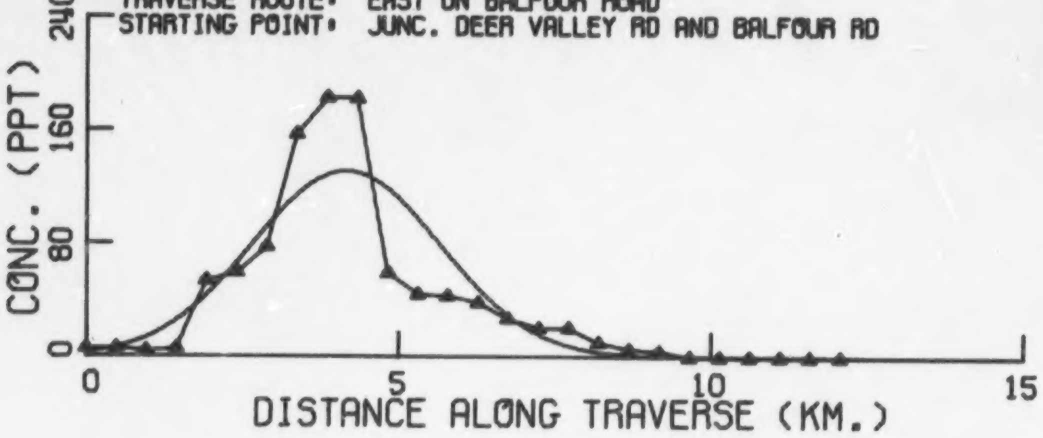
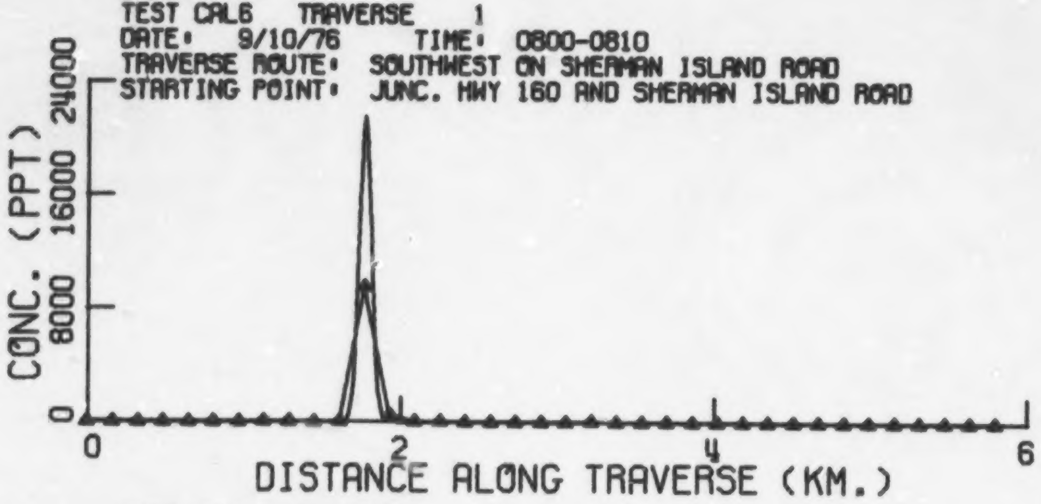
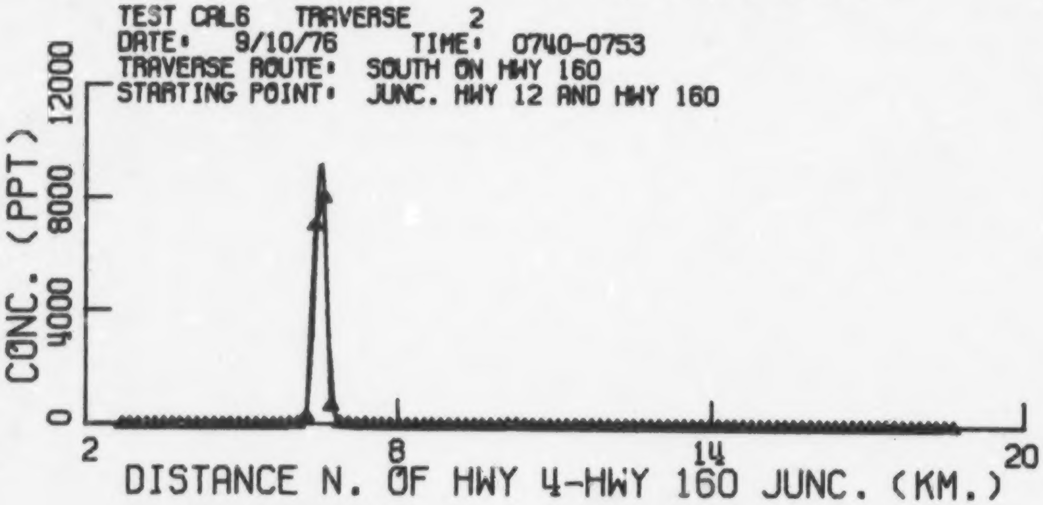


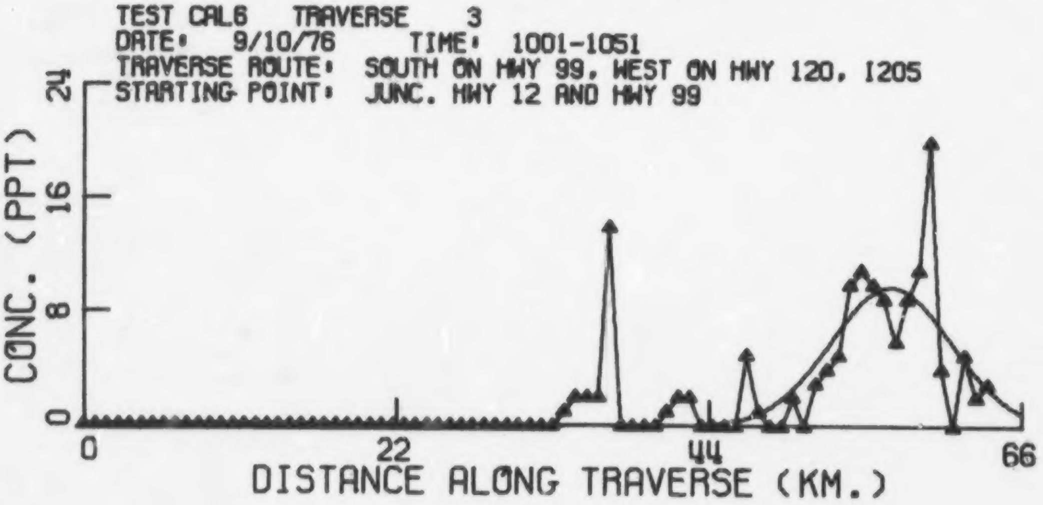
Figure 124.



TEST CAL6 TRAVERSE 1
DATE: 9/10/76 TIME: 0800-0810
TRAVERSE ROUTE: SOUTHWEST ON SHERMAN ISLAND ROAD
STARTING POINT: JUNC. HWY 160 AND SHERMAN ISLAND ROAD



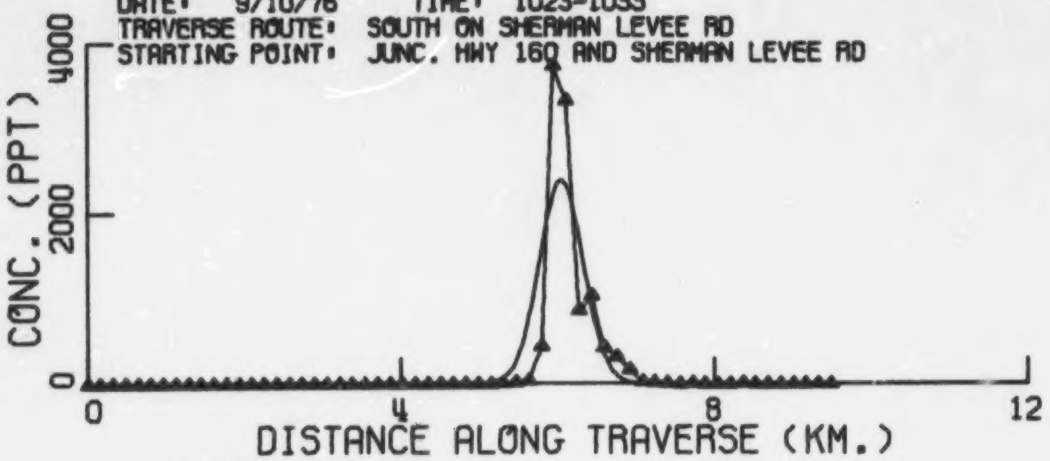
TEST CAL6 TRAVERSE 2
DATE: 9/10/76 TIME: 0740-0753
TRAVERSE ROUTE: SOUTH ON HWY 160
STARTING POINT: JUNC. HWY 12 AND HWY 160



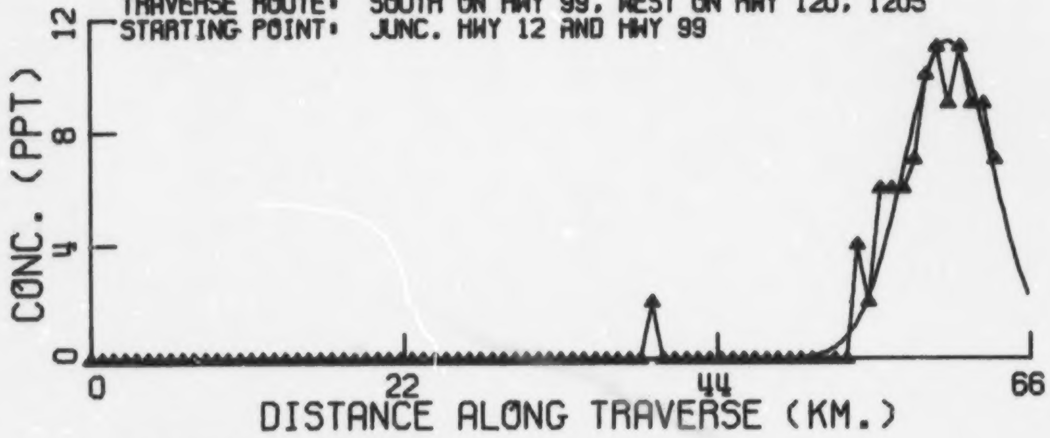
TEST CAL6 TRAVERSE 3
DATE: 9/10/76 TIME: 1001-1051
TRAVERSE ROUTE: SOUTH ON HWY 99, WEST ON HWY 120, I205
STARTING POINT: JUNC. HWY 12 AND HWY 99

Figure 125.

TEST CAL6 TRAVERSE 4
DATE: 9/10/76 TIME: 1023-1033
TRAVERSE ROUTE: SOUTH ON SHERMAN LEVEE RD
STARTING POINT: JUNC. HWY 160 AND SHERMAN LEVEE RD



TEST CAL6 TRAVERSE 5
DATE: 9/10/76 TIME: 1030-1115
TRAVERSE ROUTE: SOUTH ON HWY 99, WEST ON HWY 120, I205
STARTING POINT: JUNC. HWY 12 AND HWY 99



TEST CAL6 TRAVERSE 6
DATE: 9/10/76 TIME: 1022-1033
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: NORTH SIDE, SAN JOAQUIN RIVER BRIDGE ON HWY 160

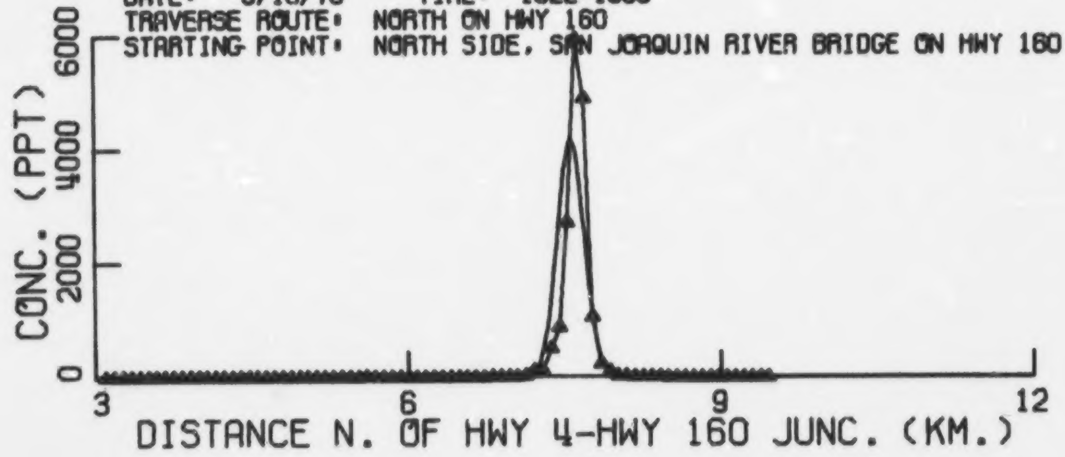
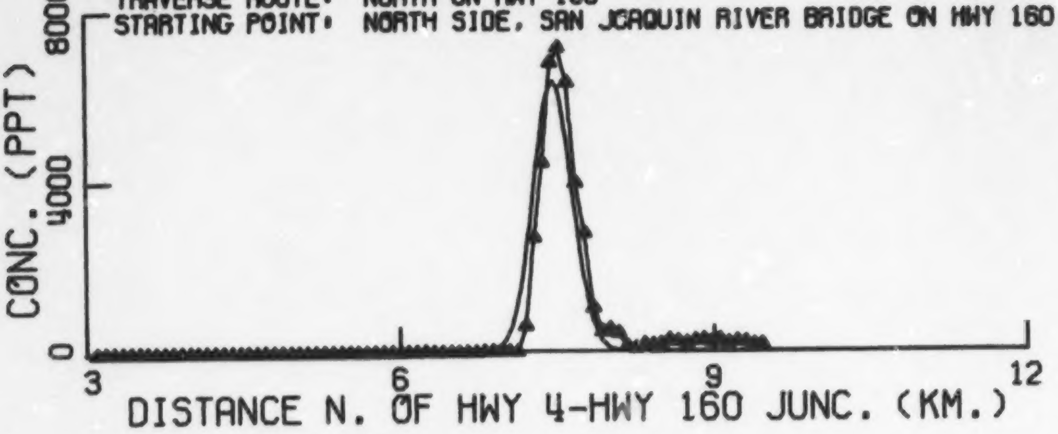


Figure 126.

TEST CAL6 TRAVERSE 7
DATE: 9/10/76 TIME: 1103-1112
TRAVERSE ROUTE: NORTH ON HWY 160
STARTING POINT: NORTH SIDE, SAN JOAQUIN RIVER BRIDGE ON HWY 160



TEST CAL6 TRAVERSE 8
DATE: 9/10/76 TIME: 1105-1203
TRAVERSE ROUTE: EAST ON I205, HWY 120, NORTH ON HWY 99
STARTING POINT: 1.5 MI EAST OF PATTERSON PASS RD AND I205 JUNC.

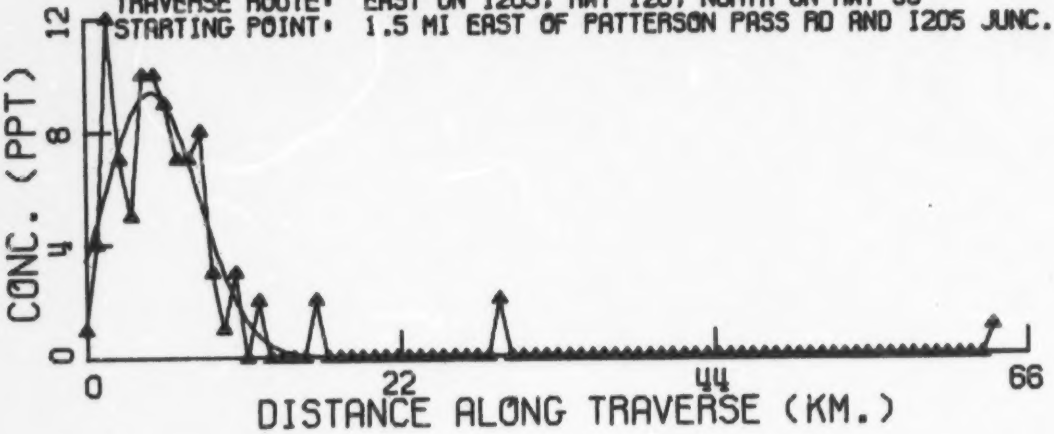
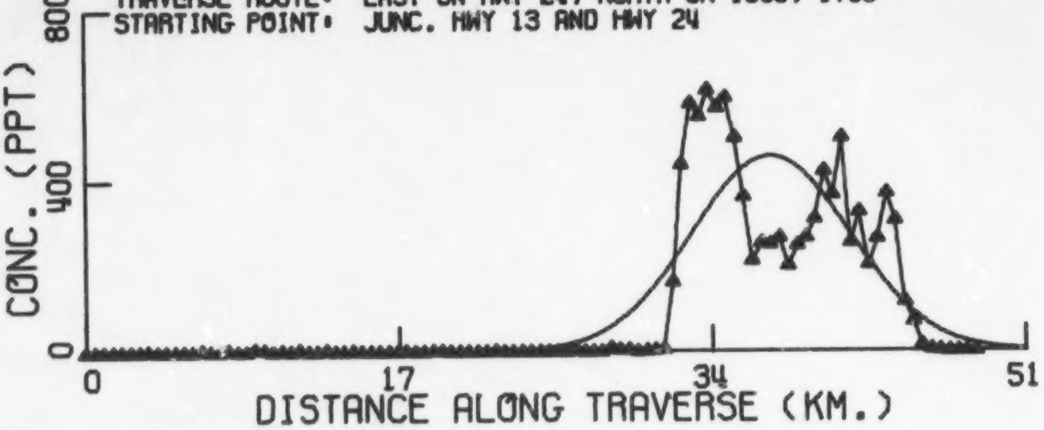
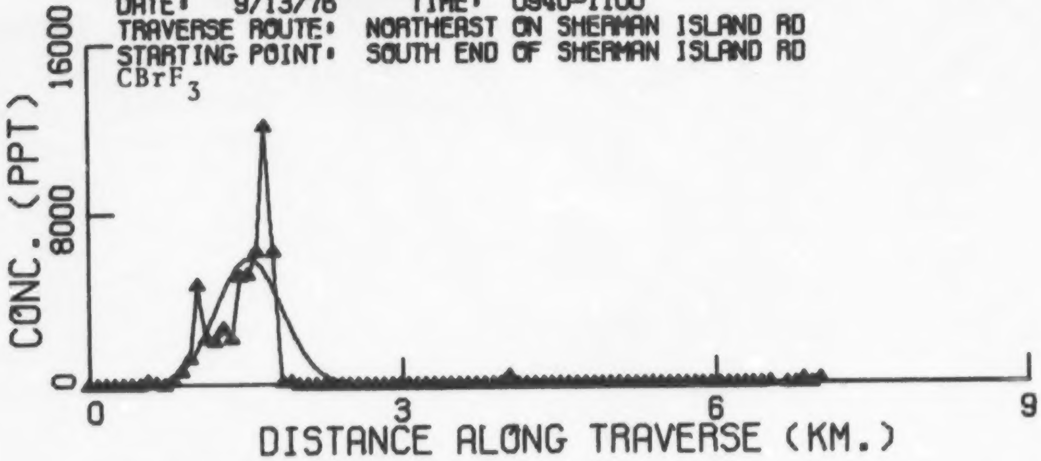


Figure 127.

TEST CAL7 TRAVERSE 1
DATE: 9/13/76 TIME: 0924-0956
TRAVERSE ROUTE: EAST ON HWY 24, NORTH ON I680, I780
STARTING POINT: JUNC. HWY 13 AND HWY 24



TEST CAL7 TRAVERSE 2
DATE: 9/13/76 TIME: 0940-1100
TRAVERSE ROUTE: NORTHEAST ON SHERMAN ISLAND RD
STARTING POINT: SOUTH END OF SHERMAN ISLAND RD



TEST CAL7 TRAVERSE 3
DATE: 9/13/76 TIME: 1113-1217
TRAVERSE ROUTE: EAST ON HWY 12, SOUTH ON HWY 160, EAST ON HWY 4
STARTING POINT: JUNC. I80 AND HWY 12

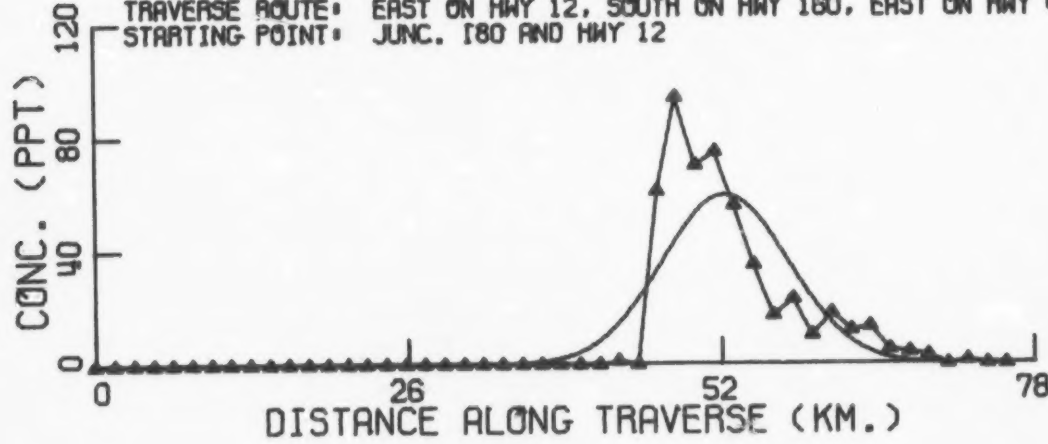
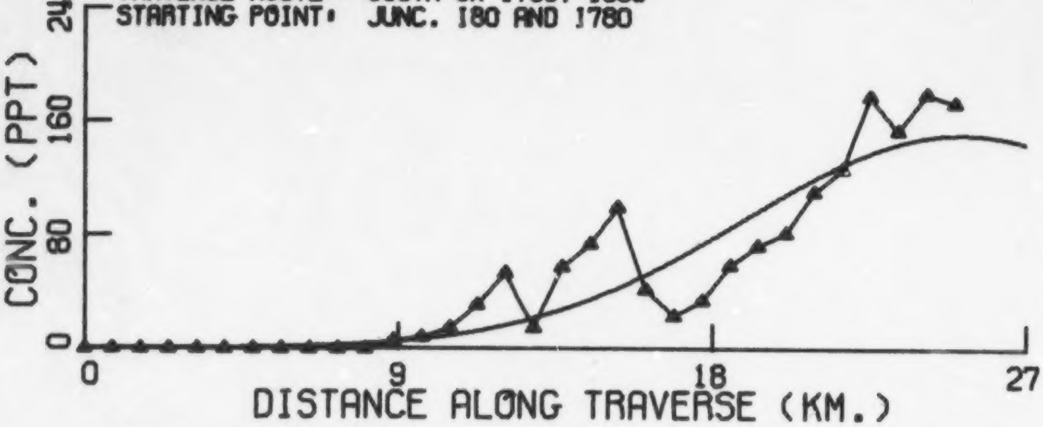
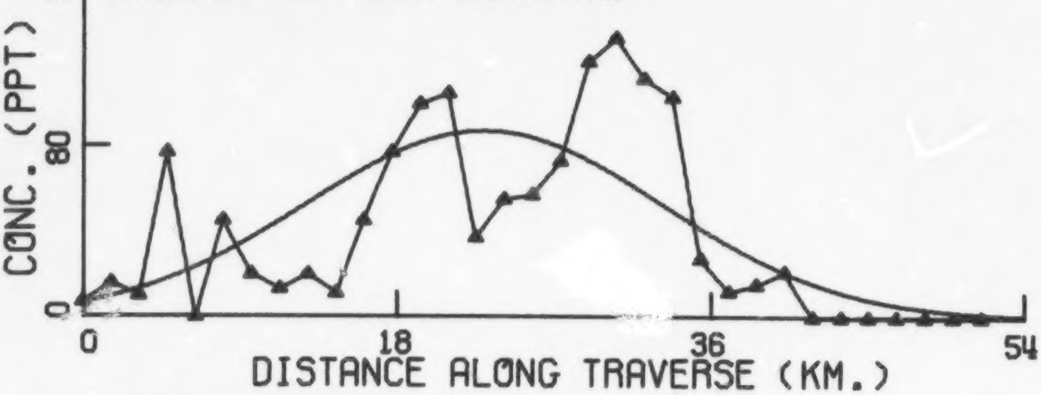


Figure 128.

TEST CAL7 TRAVERSE 4
DATE: 9/13/76 TIME: 1130-1146
TRAVERSE ROUTE: SOUTH ON I780, I680
STARTING POINT: JUNC. I80 AND I780



TEST CAL7 TRAVERSE 6
DATE: 9/13/76 TIME: 1340-1414
TRAVERSE ROUTE: SOUTH ON I780, I680, WEST ON HWY 24
STARTING POINT: JUNC. I80 AND I780



TEST CAL7 TRAVERSE 7
DATE: 9/13/76 TIME: 1429-1451
TRAVERSE ROUTE: EAST ON I580
STARTING POINT: JUNC. HWY 238 AND I580

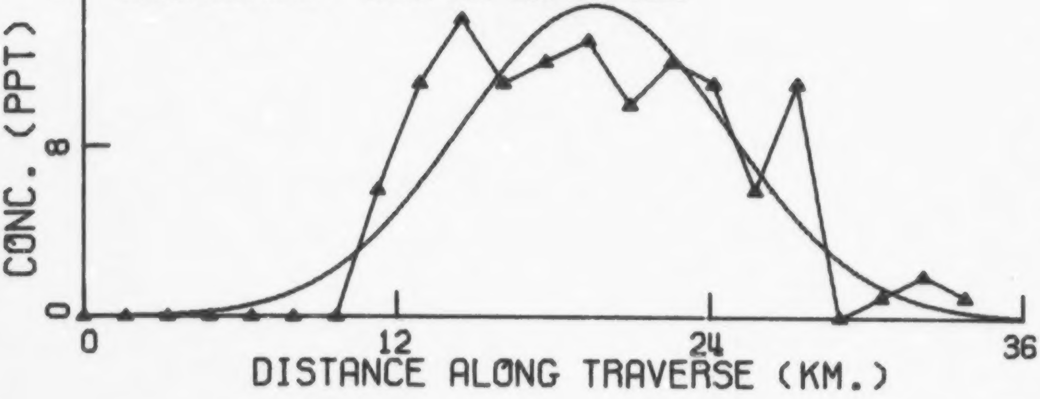
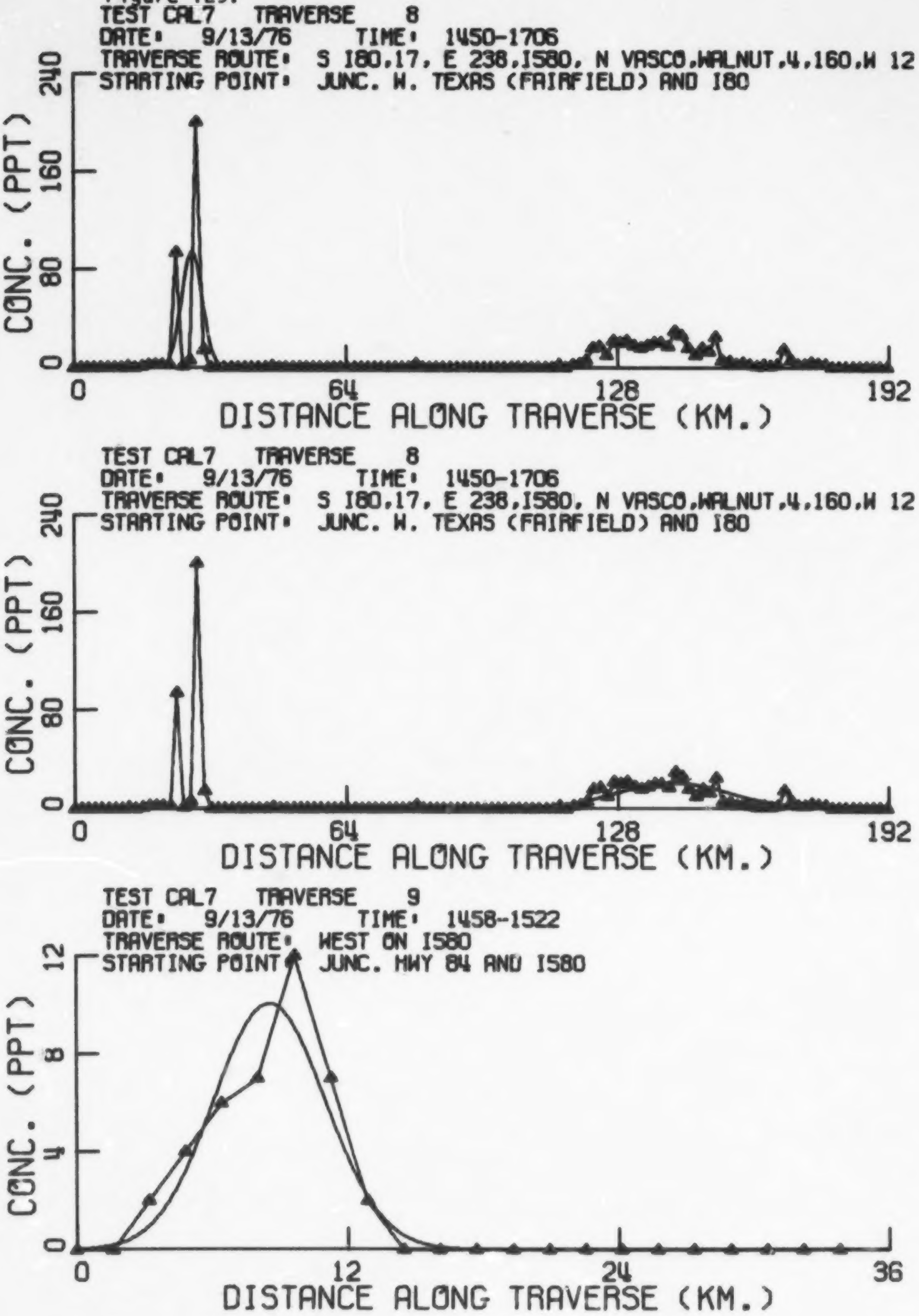


Figure 129.



TEST CAL7 TRAVERSE 8
DATE: 9/13/76 TIME: 1450-1706
TRAVERSE ROUTE: S I80,17, E 238,I580, N VASCO,WALNUT,4,160,W 12
STARTING POINT: JUNC. W. TEXAS (FAIRFIELD) AND I80

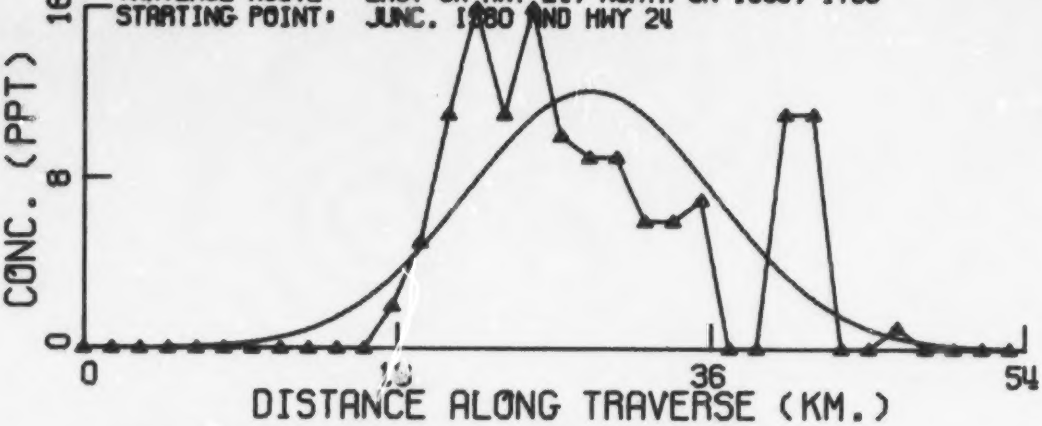
TEST CAL7 TRAVERSE 8
DATE: 9/13/76 TIME: 1450-1706
TRAVERSE ROUTE: S I80,17, E 238,I580, N VASCO,WALNUT,4,160,W 12
STARTING POINT: JUNC. W. TEXAS (FAIRFIELD) AND I80

TEST CAL7 TRAVERSE 9
DATE: 9/13/76 TIME: 1458-1522
TRAVERSE ROUTE: WEST ON I580
STARTING POINT: JUNC. HWY 84 AND I580

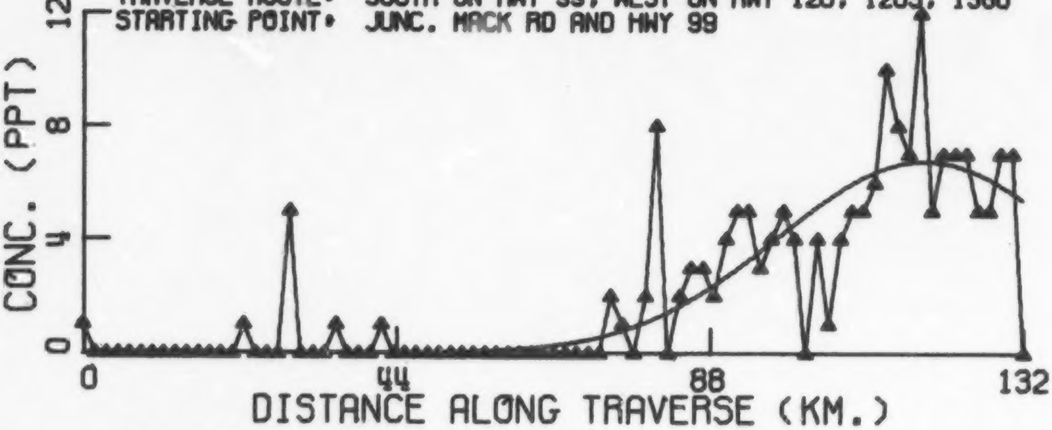
CONC. (PPT)
0
4
8
12
0
12
24
36
DISTANCE ALONG TRAVERSE (KM.)

Figure 130.

TEST CAL7 TRAVERSE 10
DATE: 9/13/76 TIME: 1537-1611
TRAVERSE ROUTE: EAST ON HWY 24, NORTH ON I680, I780
STARTING POINT: JUNC. I580 AND HWY 24



TEST CAL7 TRAVERSE 11
DATE: 9/13/76 TIME: 1654-1820
TRAVERSE ROUTE: SOUTH ON HWY 99, WEST ON HWY 120, I205, I580
STARTING POINT: JUNC. MACK RD AND HWY 99



TEST CAL7 TRAVERSE 12
DATE: 9/13/76 TIME: 1835-1901
TRAVERSE ROUTE: WEST ON I580, NORTH ON HWY 17
STARTING POINT: JUNC. HWY 84 AND I580

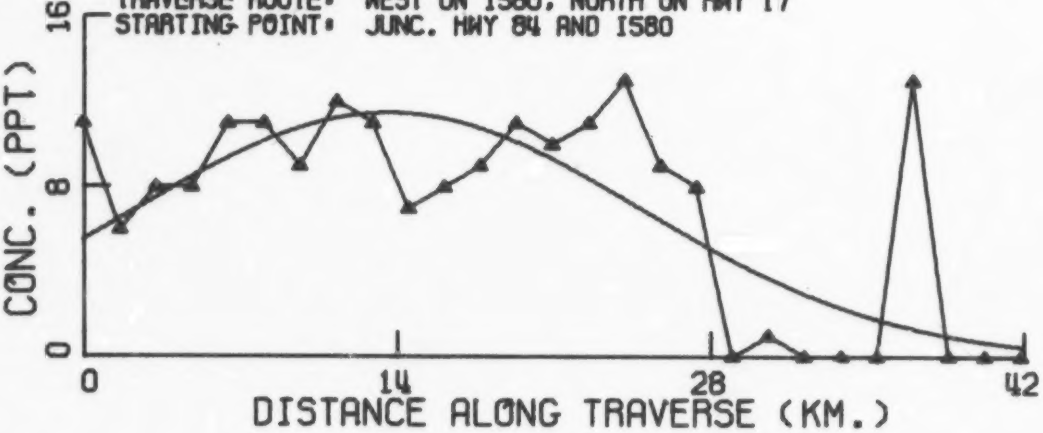
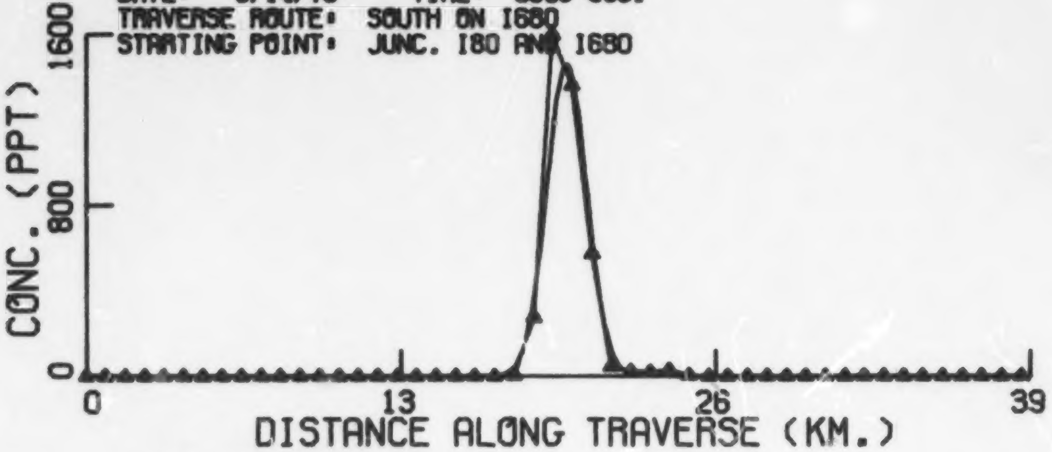
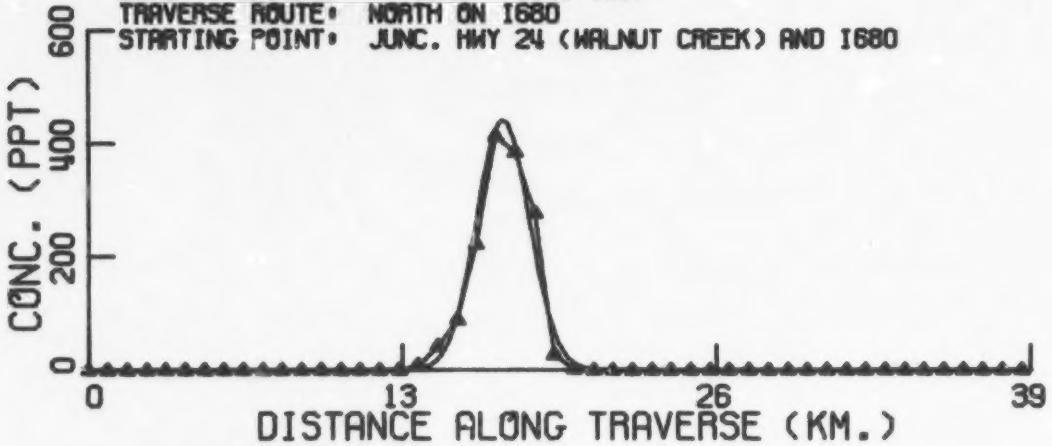


Figure 131.

TEST CAL8 TRAVERSE 1
DATE: 9/14/76 TIME: 0906-0931
TRAVERSE ROUTE: SOUTH ON I680
STARTING POINT: JUNC. I80 AND I680



TEST CAL8 TRAVERSE 2
DATE: 9/14/76 TIME: 0941-1007
TRAVERSE ROUTE: NORTH ON I680
STARTING POINT: JUNC. HWY 24 (WALNUT CREEK) AND I680



TEST CAL8 TRAVERSE 3
DATE: 9/14/76 TIME: 1047-1151
TRAVERSE ROUTE: E HWY 12, S HWY 160, W HWY 4, S HWY 24
STARTING POINT: JUNC. W. TEXAS (FAIRFIELD) AND HWY 12

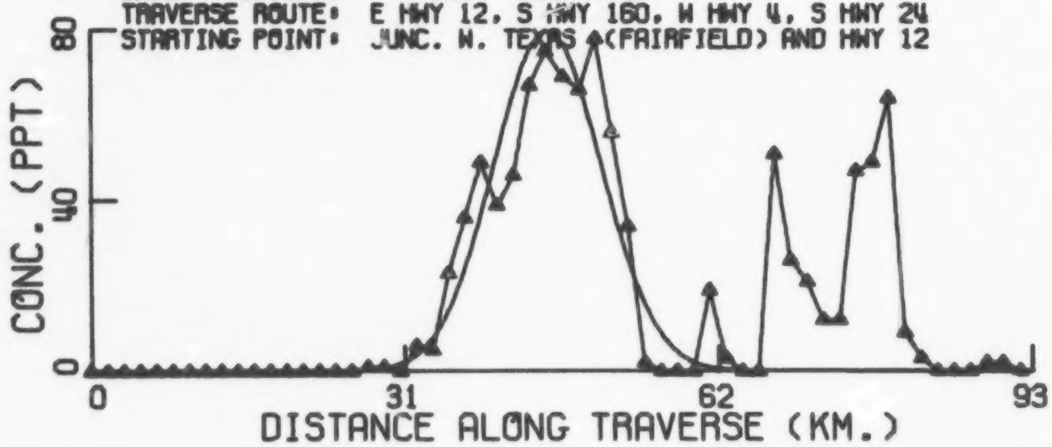
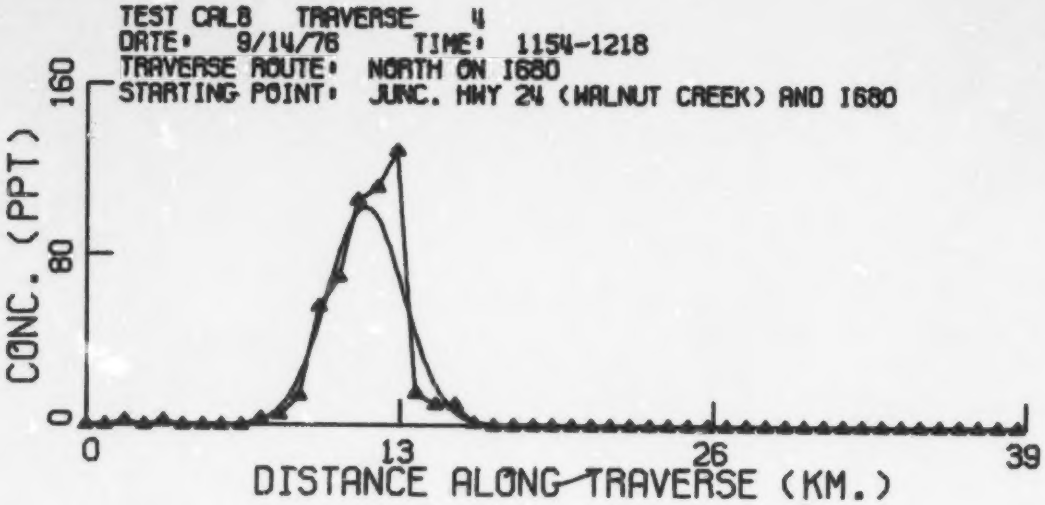


Figure 132.



TEST CAL8 TRAVERSE- 4
DATE: 9/14/76 TIME: 1154-1218
TRAVERSE ROUTE: NORTH ON I680
STARTING POINT: JUNC. HWY 24 (WALNUT CREEK) AND I680

TABLE 7

BEST-FIT GAUSSIAN PLUME RESULTS

Automobile Traverse Data

	Trav	Time PDT	C_0 exp	C_0 fitted (PPT)	Y_0 exp	Y_0 fitted (Km)	X (km)	σ_y (meters)	σ_z* (meters)
Test 1 (8/31/76) SF_6 Release Rate = 10.6 grams/sec									
	2	1420-1433	611	554	9.3	9.2	7.3	879	200
	3	1430-1445	1013	908	10.0	9.6	8.1	909	118
	4	1515-1527	756	638	8.7	10.1	6.6	1299	126
	6	1630-1641	1223	560	8.0	8.9	6.5	946	198
	7	1701-1753	64	41	65.2	65.8	51.9	9446	626
Test 2 (9/02/76) SF_6 Release Rate = 11.4 g/sec $CBrF_3$ Release Rate = 16.6 g/sec									
	1	1130-1143	30000	21830	5.5	5.9	1.3	312	22
	2	1215-1228	30000	30210	13.8	14.2	0.8	296	17
	4	1400-1415	33	26	11.6	11.6	35.2	2235	
($CBrF_3$)	4	1400-1415	2168	1228	7.7	7.7	10.7	138	657
	5	1445-1503	19	10	10.6	11.4	34.1	2673	
($CBrF_3$)	5	1445-1503	840	510	8.7	9.1	10.0	487	405
	6	1515-1530	28	4	8.7	10.2	32.8	4289	
	7	1545-1635	304	251	6.8	5.0	25.3	115	394
	9	1630-1715	29	12	57.9	60.2	70.9	24950	1169
	10	1630-1737	91	16	48.3	61.2	67.4	10692	1014
($CBrF_3$)	10	1630-1737	300	111	82.1	80.6	57.0	6227	317
	11	1731-1815	32	17	49.1	35.2	73.5	18340	479

*Values of σ_z were determined from a mass-balance procedure using the horizontal crosswind traverse data.

TABLE 7

BEST-FIT GAUSSIAN PLUME RESULTS

Automobile Traverse Data

	Trav	Time PDT	C_0 exp	C_0 fitted (PPT)	Y_0 exp	Y_0 fitted (Km)	X (km)	σ_y (meters)	σ_z* (meters)
Test 1 (8/31/76) SF_6 Release Rate = 10.6 grams/sec									
	2	1420-1433	611	554	9.3	9.2	7.3	879	200
	3	1430-1445	1013	908	10.0	9.6	8.1	909	118
	4	1515-1527	756	638	8.7	10.1	6.6	1299	126
	6	1630-1641	1223	560	8.0	8.9	6.5	946	198
	7	1701-1753	64	41	65.2	65.8	51.9	9446	626
Test 2 (9/02/76) SF_6 Release Rate = 11.4 g/sec $CBrF_3$ Release Rate = 16.6 g/sec									
	1	1130-1143	30000	21830	5.5	5.9	1.3	312	22
	2	1215-1228	30000	30210	13.8	14.2	0.8	296	17
	4	1400-1415	33	26	11.6	11.6	35.2	2235	
($CBrF_3$)	4	1400-1415	2168	1228	7.7	7.7	10.7	138	657
	5	1445-1503	19	10	10.6	11.4	34.1	2673	
($CBrF_3$)	5	1445-1503	840	510	8.7	9.1	10.0	487	405
	6	1515-1530	28	4	8.7	10.2	32.8	4289	
	7	1545-1635	304	251	6.8	5.0	25.3	115	394
	9	1630-1715	29	12	57.9	60.2	70.9	24950	1169
	10	1630-1737	91	16	48.3	61.2	67.4	10692	1014
($CBrF_3$)	10	1630-1737	300	111	82.1	80.6	57.0	6227	317
	11	1731-1815	32	17	49.1	35.2	73.5	18340	479

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*Values of σ_z were determined from a mass-balance procedure using the horizontal crosswind traverse data.

TABLE 7 (cont.)

BEST-FIT GAUSSIAN PLUME RESULTS

Automobile Traverse Data

Trav	Time PDT	C_0 exp	C_0 fitted (PPT)	Y_0 exp	Y_0 fitted (Km)	X (km)	σ_y (meters)	σ_z* (meters)
Test 3 (9/5/76) SF_6 Release Rate = 9.5 g/sec								
1	0100-0112	8146	9476	6.1	6.1	7.3	142	35
3	0213-0259	537	458	32.2	34.4	51.7	2480	72
4	0240-0300	1856	1944	7.4	7.4	7.3	141	166
6	0259-0306	8660	4298	6.8	6.8	7.3	136	97
8	0414-0545	370	283	54.7	55.8	47.4	4503	85
9	0430-0445	6178	6775	7.2	7.3	7.3	116	80
10	0432-0517	608	506	29.5	31.3	39.5	1936	100
11	0441-0450	2852	2288	7.1	7.2	7.3	151	183
12	0502-0511	2261	1502	6.6	6.6	7.3	195	229
14	0637-0647	173	121	1.6	0.5	37.2	4685	517
Test 4 (9/6/76) SF_6 Release Rate = 10.8 g/sec								
1	1928-1946	873	710	7.1	7.2	7.3	210	
2	2130-2217	746	680	15.3	15.8	50.9	2072	93
3	2132-2140	10570	8825	7.1	7.2	7.3	191	45
4	2200-2246	628	580	15.3	17.5	50.9	1987	109
5	2214-2222	11900	10820	6.5	6.5	7.3	118	59
6	2232-2320	553	396	37.8	38.7	54.5	2787	114
7	2315-2400	553	281	35.4	39.9	58.8	3819	142

*Values of σ_z were determined from a mass-balance procedure using the horizontal crosswind traverse data.

TABLE 7 (cont.)

BEST-FIT GAUSSIAN PLUME RESULTS

Automobile Traverse Data

Trav	Time PDT	C_0 exp (PPT)	C_0 fitted (PPT)	Y_0 exp (Km)	Y_0 fitted (Km)	X (km)	σ_y (meters)	σ_z* (meters)
Test 5 (9/9/76) SF_6 Release Rate = 10.7 g/sec								
1	1255-1315	801	363	11.9	12.6	9.1	721	
2	1314-1330	528	288	8.4	8.9	9.4	877	
4	1351-1405	138	136	1.0	1.4	17.7	1192	
5	1356-1428	108	87	2.9	1.1	24.3	2416	
6	1359-1416	445	285	18.3	15.8	10.6	1636	1228
7	1413-1426	141	111	8.7	9.5	18.5	1525	
8	1436-1450	183	131	3.9	4.2	18.6	1382	
Test 6 (9/10/76) SF_6 Release Rate								
1	0800-0815	9526	21500	1.8	1.8	4.8	27	196
2	0740-0753	7981	9257	6.6	6.5	7.3	110	110
3	1001-1051	20	10	59.5	56.8	47.6	4164	
4	1023-1033	3739	2393	6.0	6.1	11.7	275	135
5	1030-1115	11	11	59.5	60.3	47.6	3062	
6	1022-1033	5954	4179	7.6	7.6	7.3	129	165
7	1103-1112	7155	6346	7.5	7.5	7.3	185	76
8	1105-1203	12	10	1.6	4.7	45.8	2975	
Airborne Spirals								
				(m)	(m)		σ_z**	
1	1158-1203	908	692	122	112	19.5	38	

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* Values of σ_z were determined from a mass-balance procedure using the horizontal crosswind traverse data.

**Values of σ_z were obtained from a Gaussian best-fit of the spiral tracer data.

TABLE 7 (cont.)

BEST-FIT GAUSSIAN PLUME RESULTS

Automobile Traverse Data

Trav	Time PDT	C_0 exp	C_0 fitted (PPT)	Y_0 exp	Y_0 fitted (Km)	X (km)	σ_y (meters)	σ_z* (meters)
Test 7 (9/13/76)	SF_6 Release Rate = 11.5 g/sec $CBrF_3$ Release Rate = 16.0 g/sec							
1	0924-0956	614	459	33.8	37.2	15.3	3714	1388
($CBrF_3$) 2	0940	12140	5896	1.7	1.5	4.6	310	106
3	1113-1217	94	60	48.3	52.3	50.7	4697	736
4	1130-1146	180	151	24.1	25.1	22.0	6165	3481
6	1340-1414	131	87	30.6	23.0	22.4	6944	792
7	1429-1451	14	15	14.5	19.6	47.4	3881	
8	1450-1706	200	95	29.0	27.8	5.6	375	492
8	1450-1706	30	21	141.6	140.9	54.7	13203	
9	1458-1532	12	10	9.7	8.5	52.7	1654	
10	1537-1611	16	12	22.5	29.0	22.9	6746	
11	1654-1620	12	7	117.5	118	65.9	14520	
12	1654-1820	13	11	24.1	13.6	42.8	9881	
			Spirals					
				(m)	(m)		σ_z**	
1	0854-0849	109	109	61	113	21.5	59	
3	1008-1011	413	485	122	141	21.5	77	

*Values of σ_z were determined from a mass-balance procedure using the horizontal crosswind traverse data.

**Values of σ_z were obtained from a Gaussian best-fit of the spiral tracer data.

TABLE 7 (cont.)

BEST-FIT GAUSSIAN PLUME RESULTS

Automobile Traverse Data

Trav	Time PDT	C_0		Y_0		X (km)	σ_y (meters)	σ_z* (meters)
		exp	fitted (PPT)	exp	fitted (Km)			
Test 8 (9/14/76) SF_6 Release Rate = 10.9 g/sec								
1	0906-0931	1598	1461	19.3	19.9	14.4	713	273
2	0941-1007	412	440	16.9	17.2	15.7	953	
3	1047-1151	78	80	49.9	45.2	48.9	4604	380
4	1154-1220	129	103	12.9	11.6	18.4	1016	
				Spirals				
				(m)	(m)		σ_z**	
1	0921-0926	858	541	137	169	21.5	91	

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[*] Values of σ_z were determined from a mass-balance procedure using the horizontal crosswind traverse data.

[**] Values of σ_z were obtained from a Gaussian best-fit of the spiral tracer data.

3.7 Airborne Spiral Best-fit Gaussian Curves

A best-fit Gaussian curve through the data can be determined in the same manner as that used for the automobile traverses (Section 3.4). In this case, Y_0 is the height along the spiral, C_0 is the centerline concentration, and the standard deviation becomes the vertical dispersion parameter, σ_z. The results are shown in the following figures. The best-fit parameters are listed in Table 7. The analysis of σ_z is more restricted than that of σ_y for three reasons: (1) the spiral location may or may not have been at the centerline of the plume; (2) the plane was spiraling downward with a horizontal diameter of approximately 400 meters; and (3) the tracer plume was reflected from the ground which prevented a perfect Gaussian distribution of tracer. If the spiral was not taken along the centerline, the calculated σ_z will be smaller than the actual σ_z. Because the plane moves horizontally, the data represent a vertical profile averaged over 400 meters of the plume crosswidth. In some cases, samples may have been taken completely outside of the plume. Reflection of tracer at the ground results in a buildup of material along the ground and causes the tracer distribution to be skewed and non-Gaussian. In any use of the σ_z best-fit parameters, the effects of these restrictions must be accounted for in the analysis.

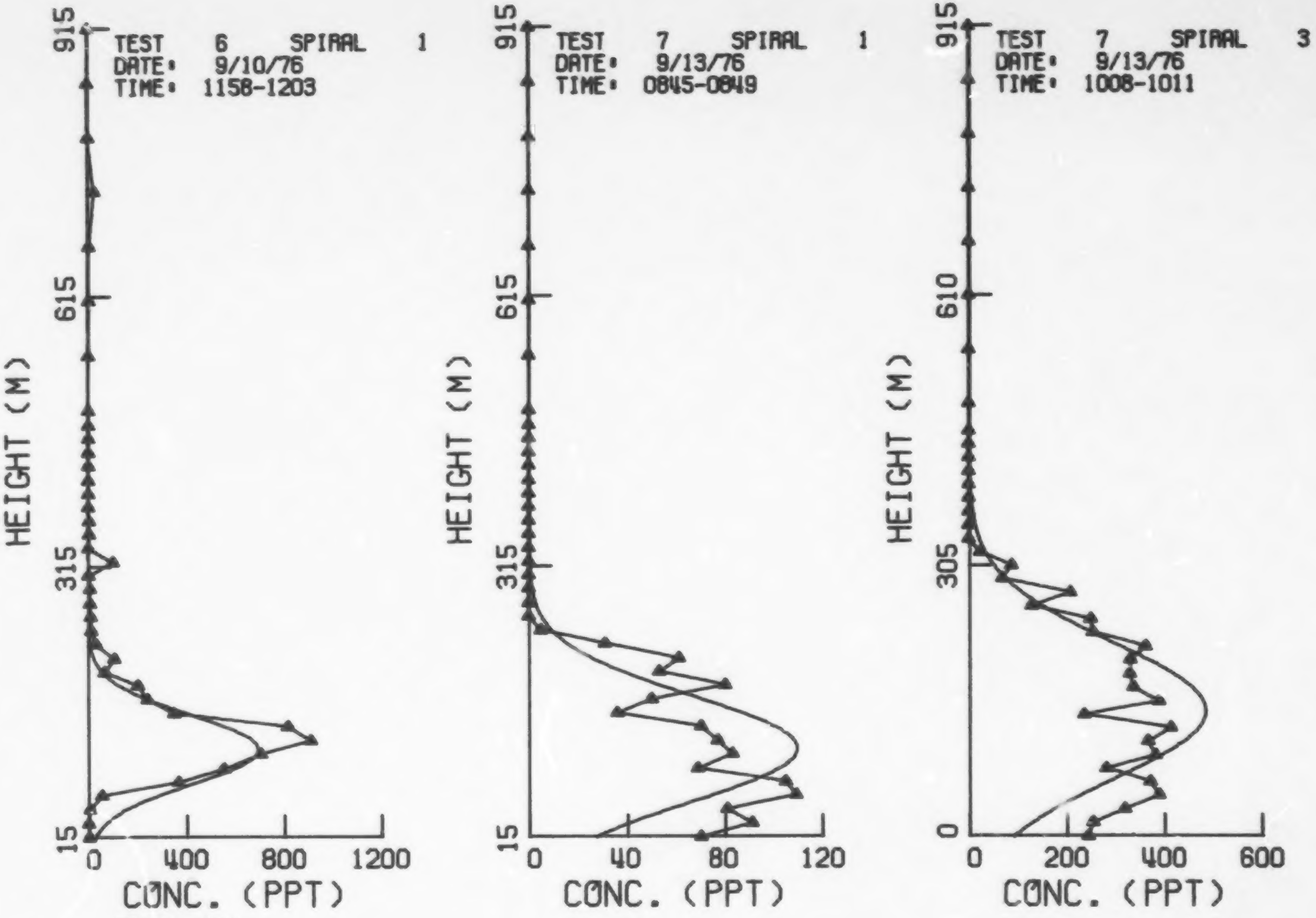

TEST 6 SPIRAL 1
DATE: 9/10/76
TIME: 1158-1203
HEIGHT (M)
915
615
315
15
0
400
800
1200
CONC. (PPT)
TEST 7 SPIRAL 1
DATE: 9/13/76
TIME: 0845-0849
HEIGHT (M)
915
615
315
15
0
40
80
120
CONC. (PPT)
TEST 7 SPIRAL 3
DATE: 9/13/76
TIME: 1008-1011
HEIGHT (M)
915
610
305
0
0
200
400
600
CONC. (PPT)

Figure 133.

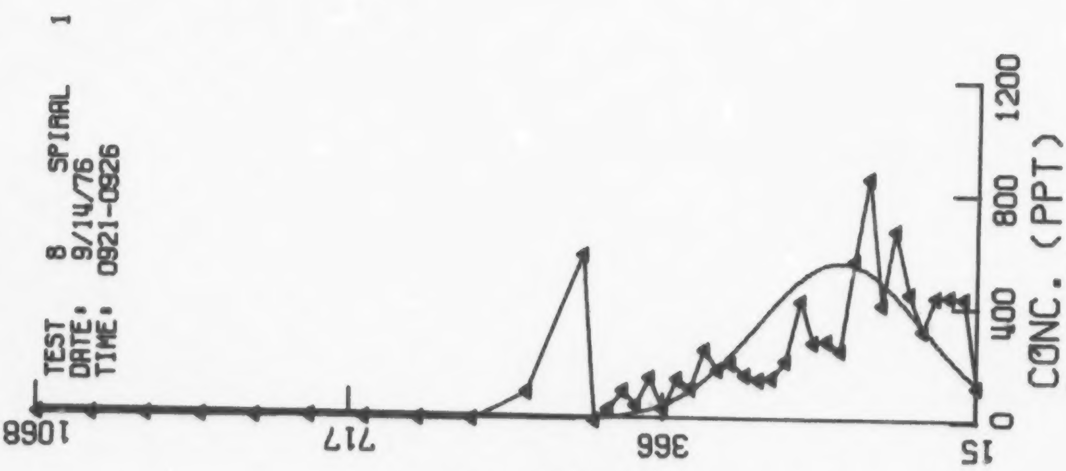

TEST 8 SPIRAL 1
DATE: 9/14/76
TIME: 0921-0926
HEIGHT (M)
1068
717
366
15
CONC. (PPT)
0
400
800
1200

Figure 134.

3.8 Hourly Averaged Tracer Data

Tracer concentrations averaged over one hour have been plotted in the 12-hour and 3-hour bar graphs shown in the following figures. The station numbers shown in each bar graph correspond to those given in Figure 1 and Table 2.

Figure 135.

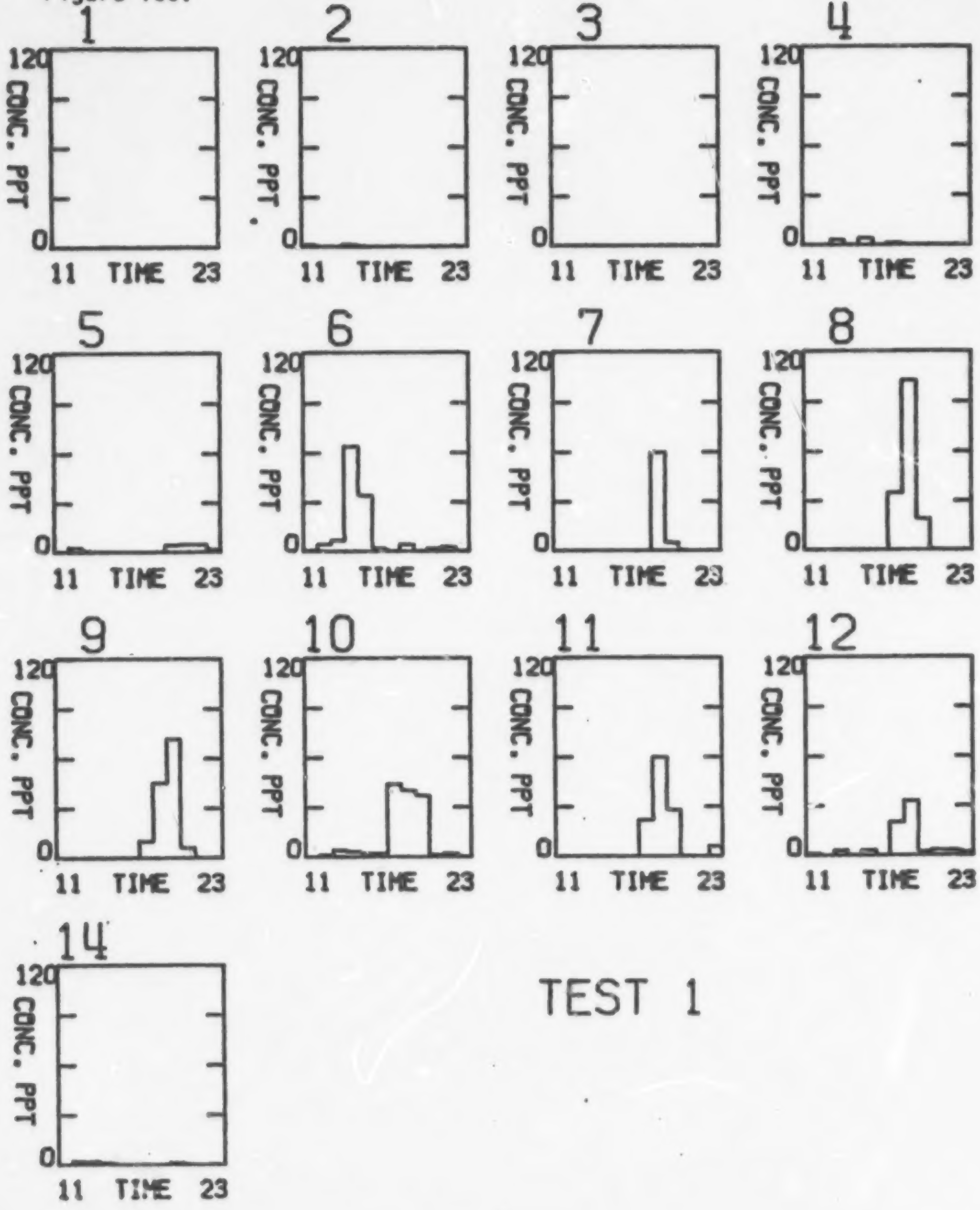


Figure 136.

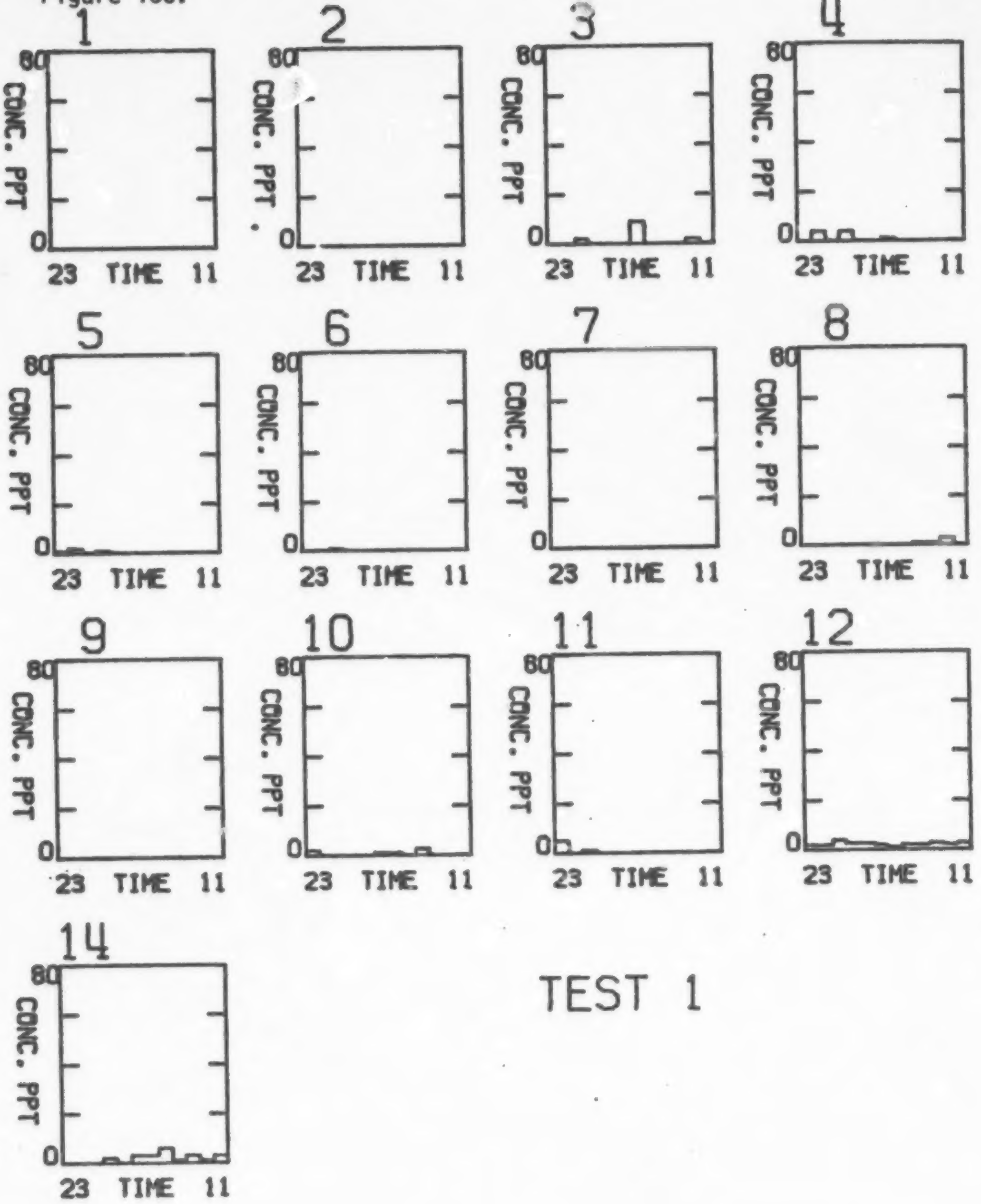
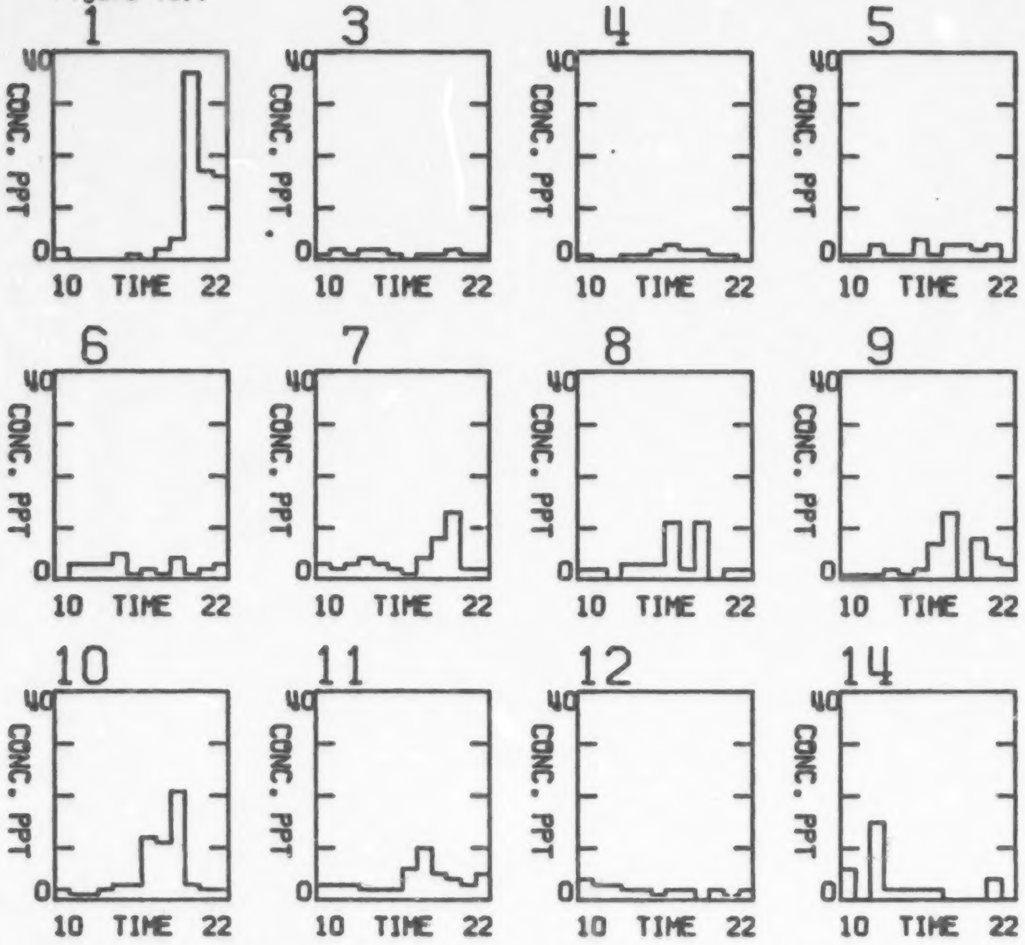

1
80
CONC. PPT
0
23 TIME 11
2
80
CONC. PPT
0
23 TIME 11
3
80
CONC. PPT
0
23 TIME 11
4
80
CONC. PPT
0
23 TIME 11
5
80
CONC. PPT
0
23 TIME 11
6
80
CONC. PPT
0
23 TIME 11
7
80
CONC. PPT
0
23 TIME 11
8
80
CONC. PPT
0
23 TIME 11
9
80
CONC. PPT
0
23 TIME 11
10
80
CONC. PPT
0
23 TIME 11
11
80
CONC. PPT
0
23 TIME 11
12
80
CONC. PPT
0
23 TIME 11
14
80
CONC. PPT
0
23 TIME 11
TEST 1

Figure 137.



TEST 2

Figure 138.

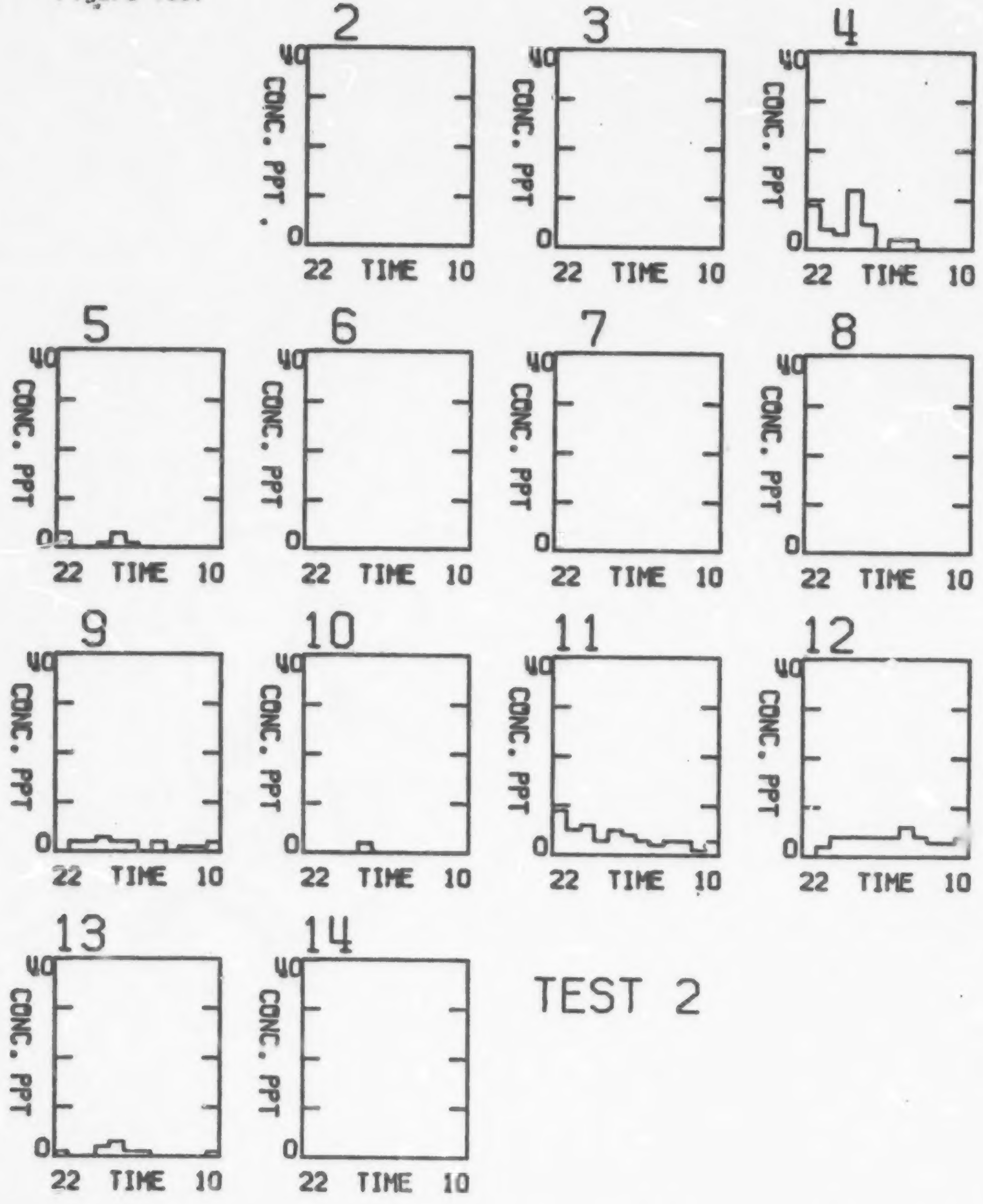


Figure 139.

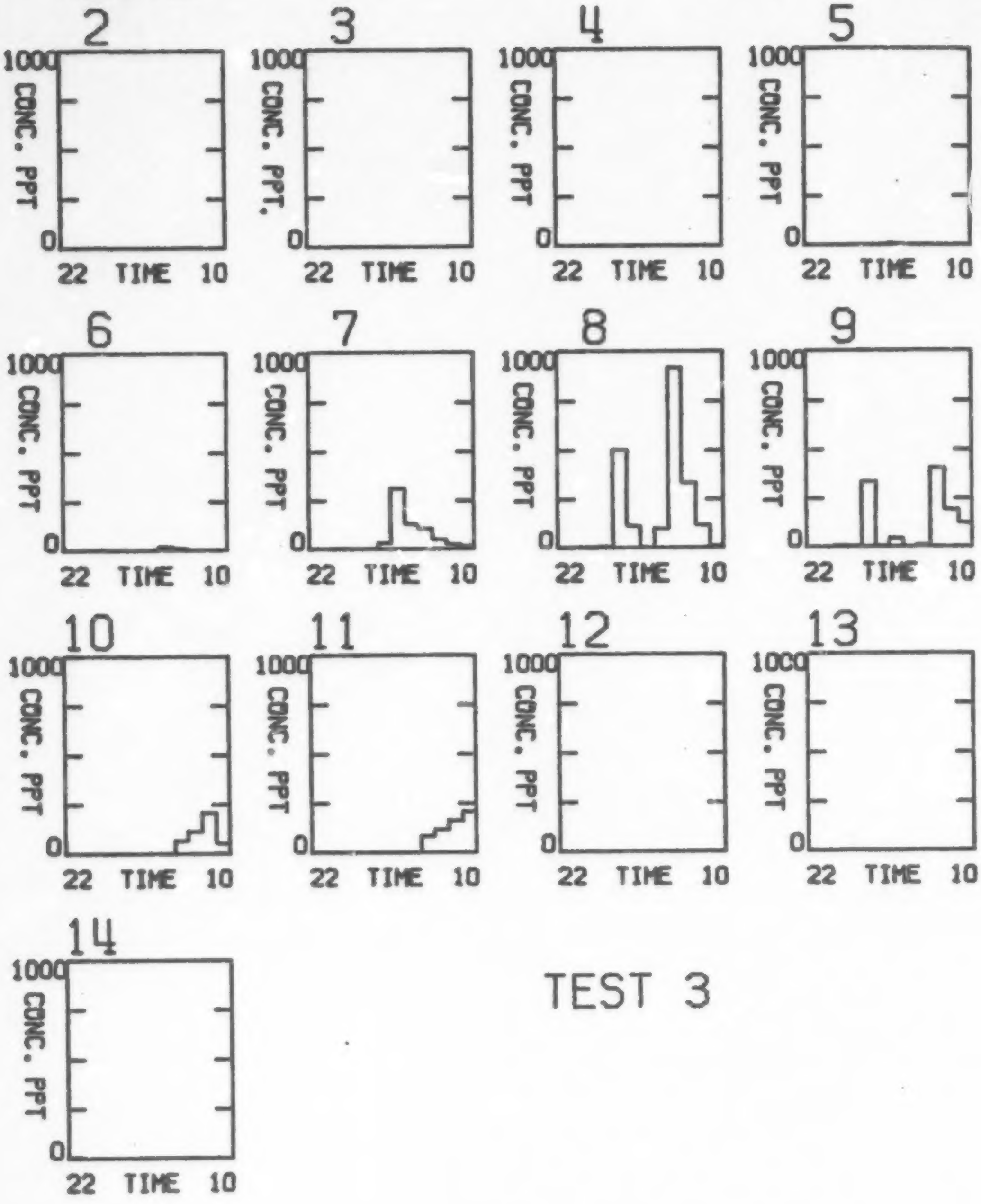


Figure 140.

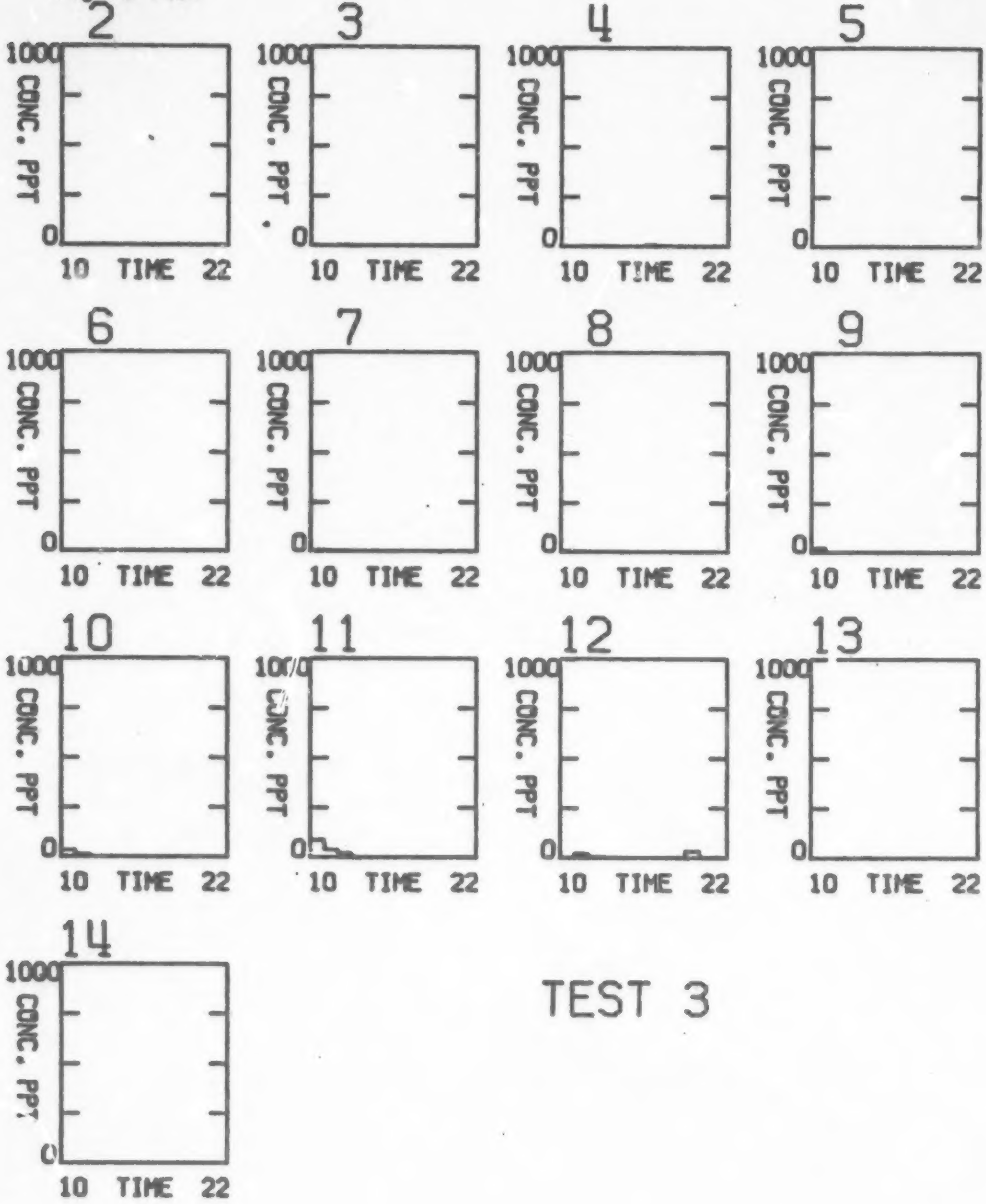
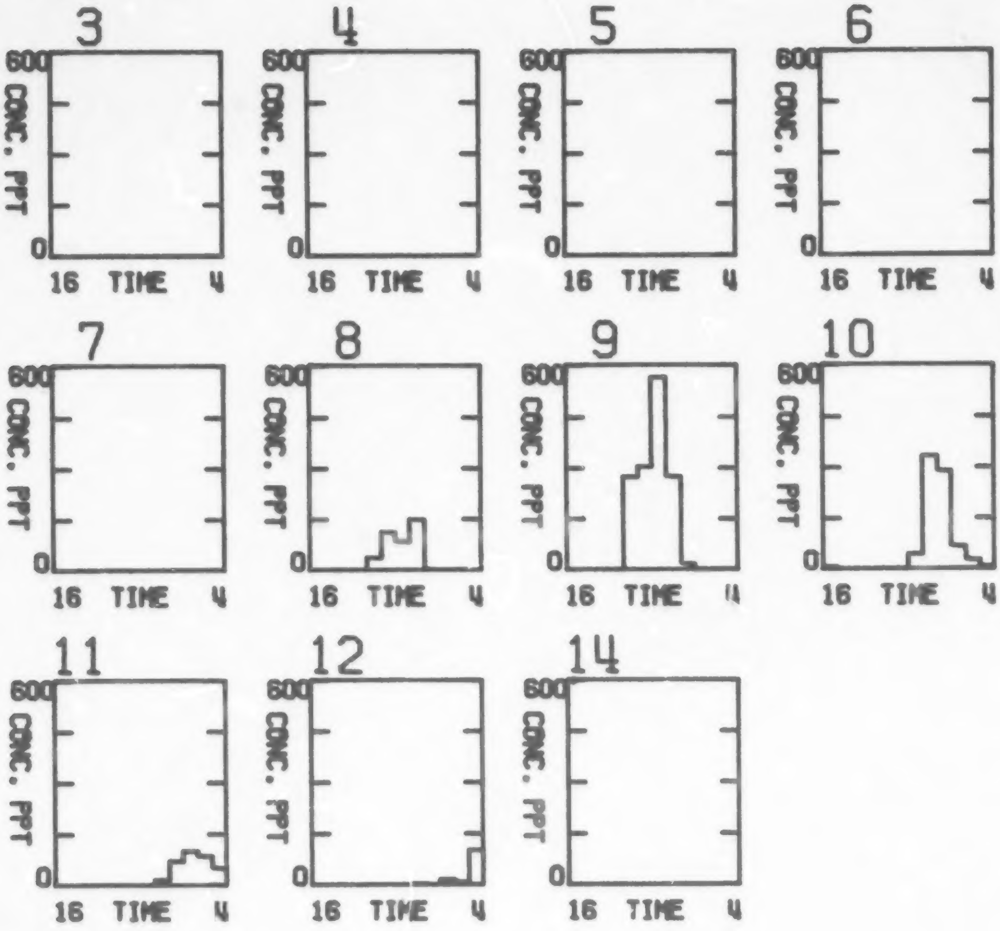


Figure 141.



TEST 4

Figure 141a.

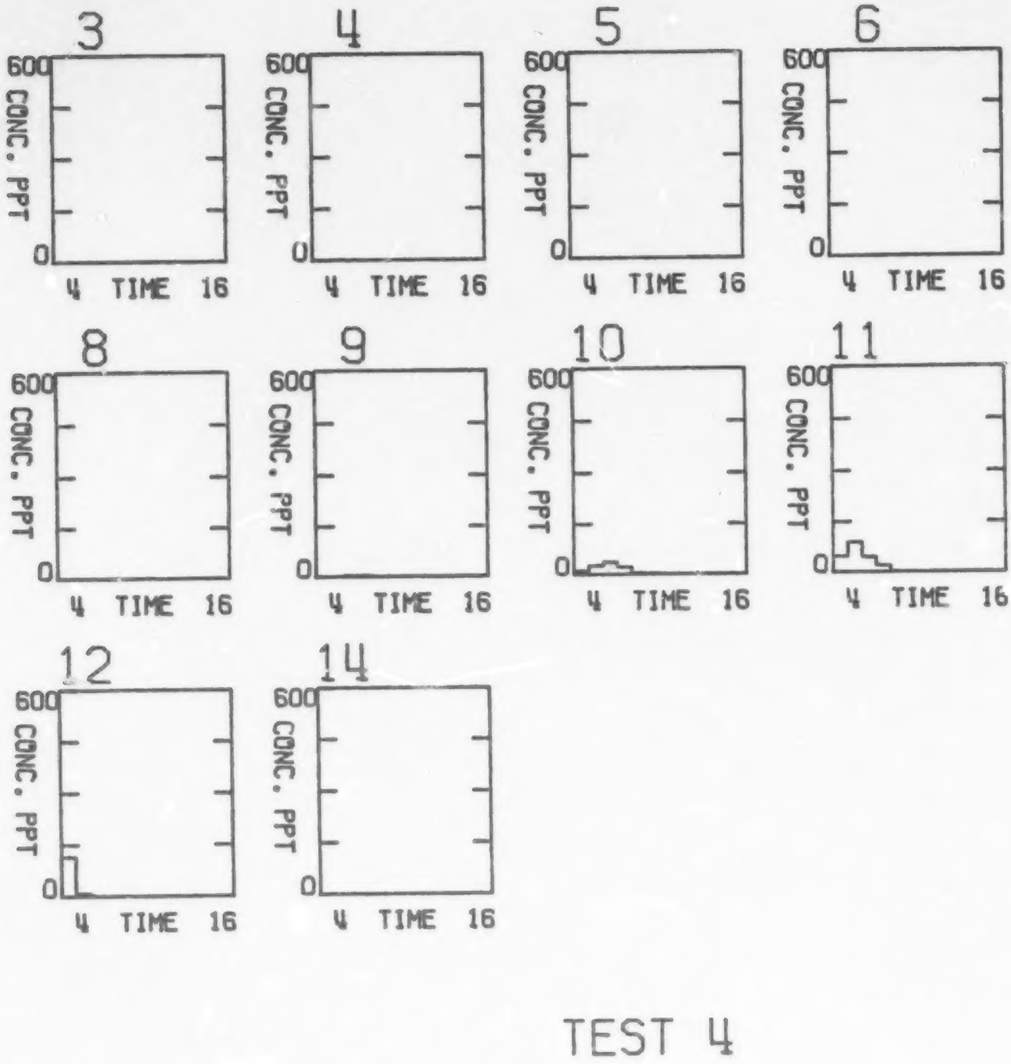


Figure 142.

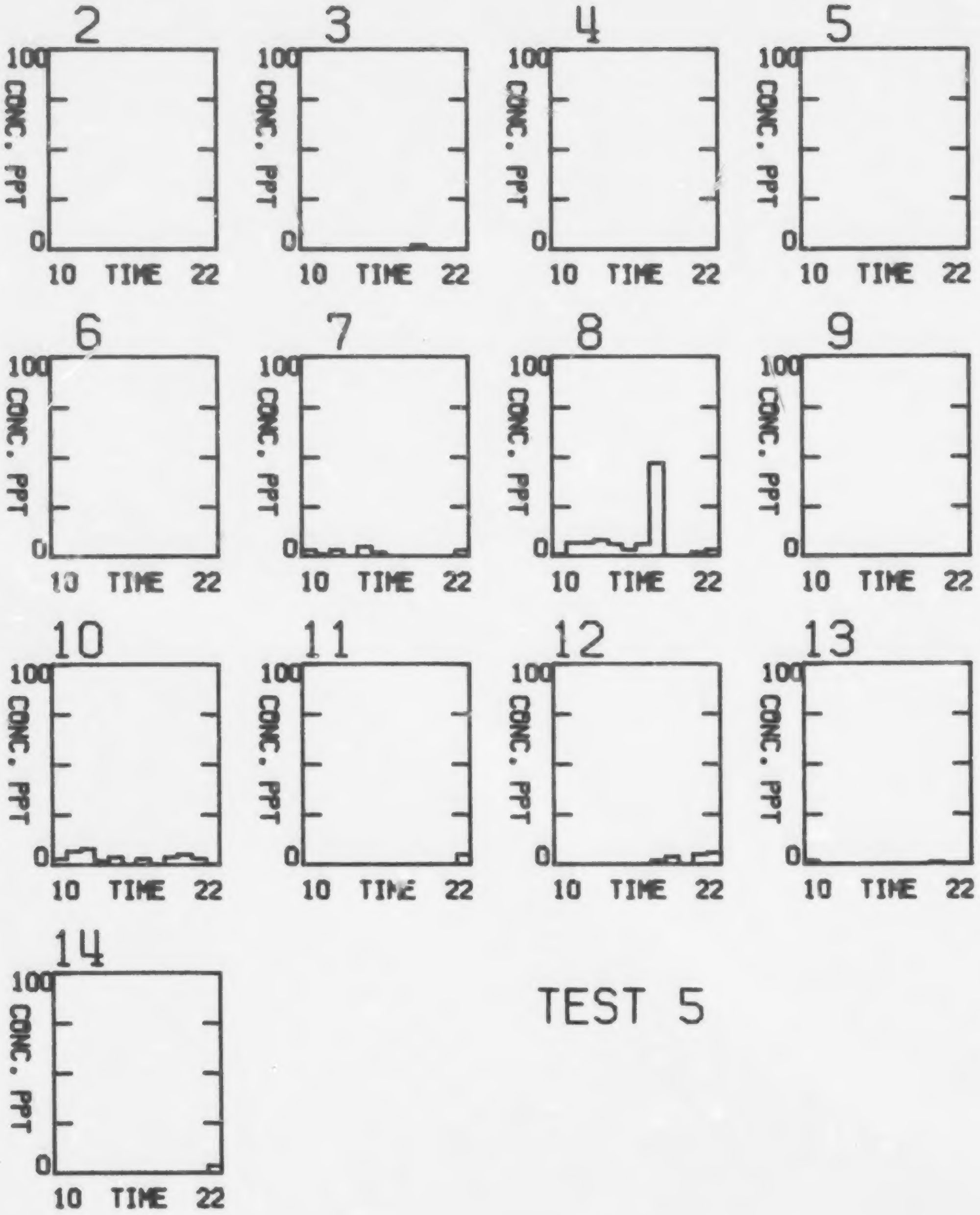
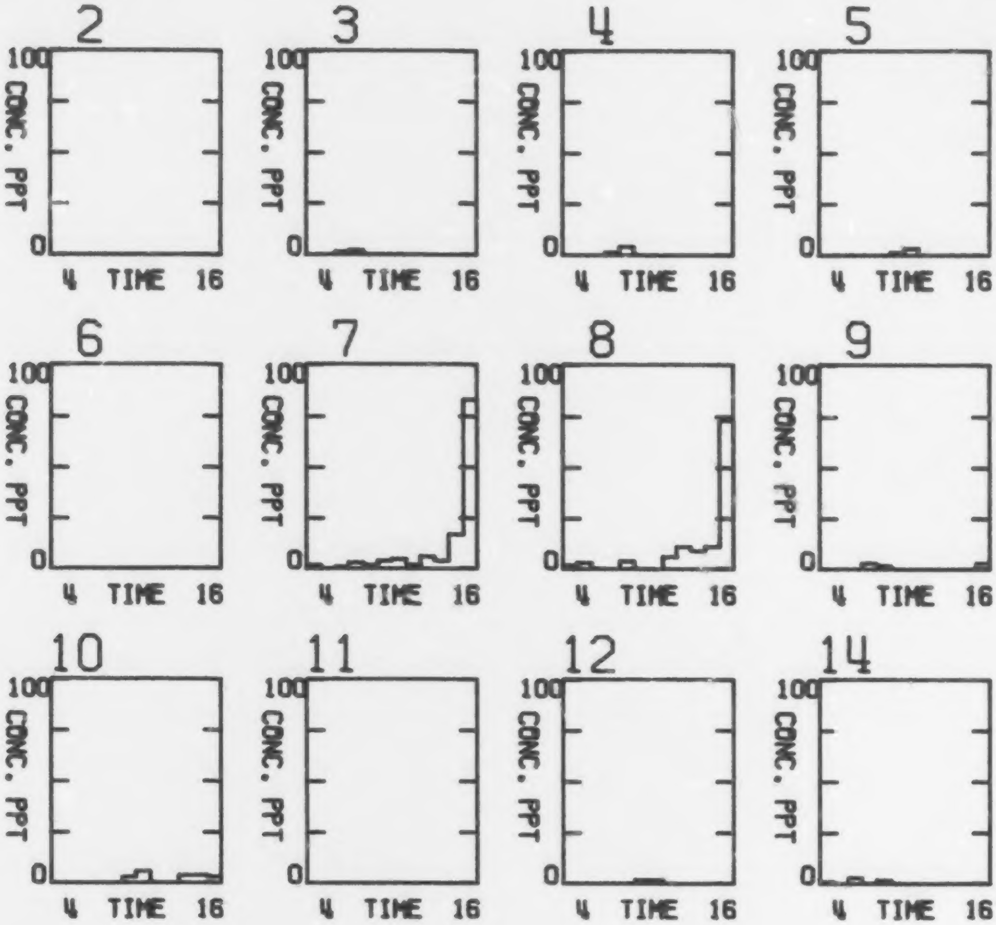


Figure 143.



TEST 6

Figure 144.

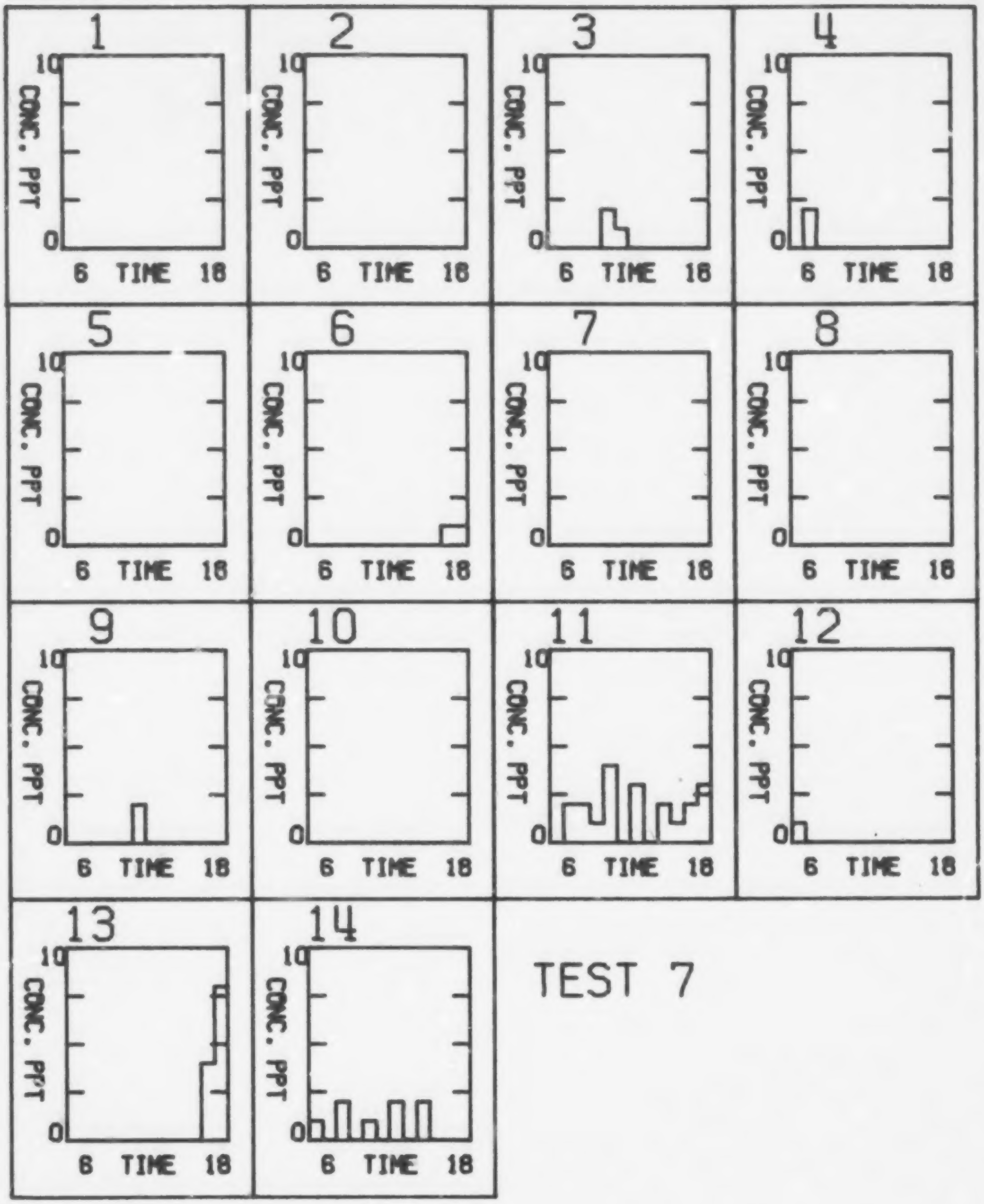
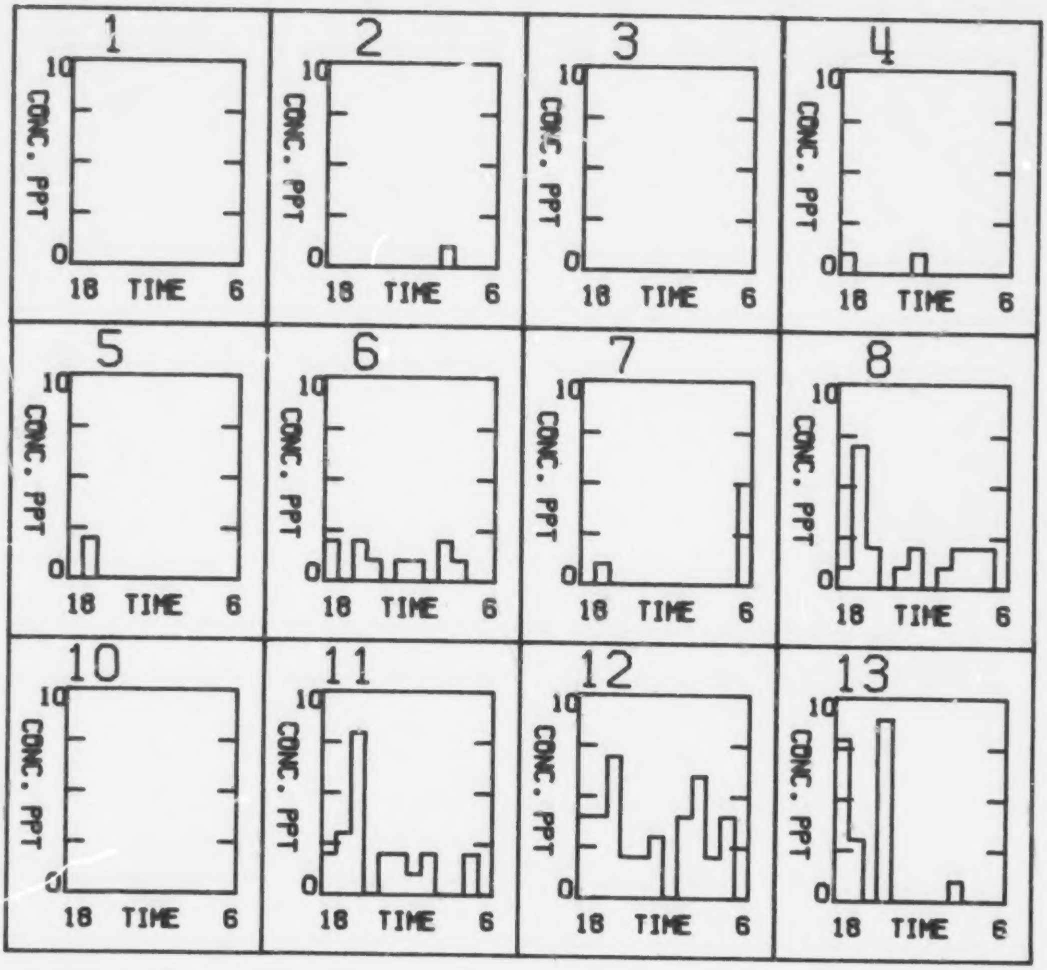


Figure 145.



TEST 7

Figure 146.

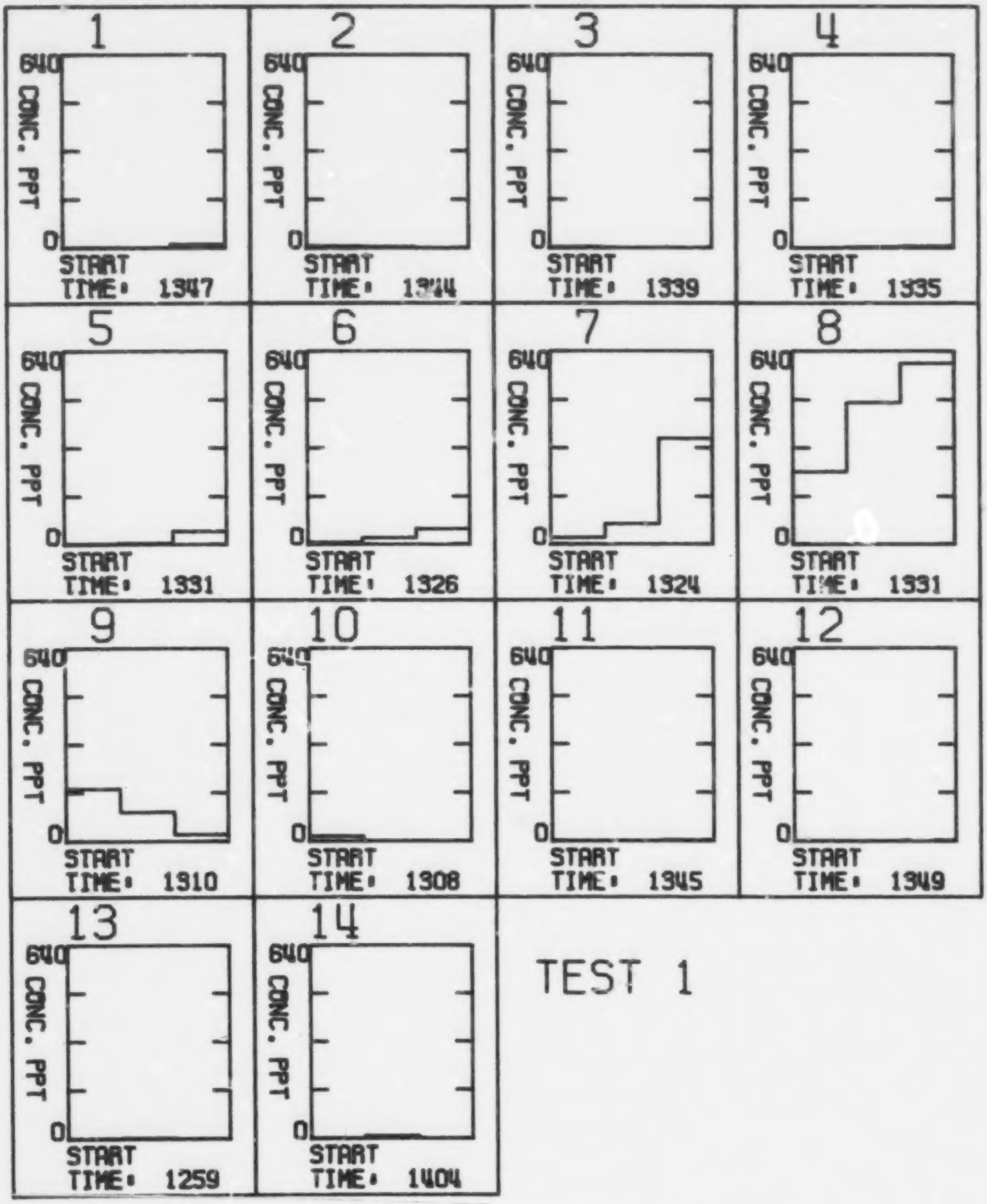

1
640
CONC. PPT
0
START
TIME: 1347
2
640
CONC. PPT
0
START
TIME: 1344
3
640
CONC. PPT
0
START
TIME: 1339
4
640
CONC. PPT
0
START
TIME: 1335
5
640
CONC. PPT
0
START
TIME: 1331
6
640
CONC. PPT
0
START
TIME: 1326
7
640
CONC. PPT
0
START
TIME: 1324
8
640
CONC. PPT
0
START
TIME: 1331
9
640
CONC. PPT
0
START
TIME: 1310
10
640
CONC. PPT
0
START
TIME: 1308
11
640
CONC. PPT
0
START
TIME: 1345
12
640
CONC. PPT
0
START
TIME: 1349
13
640
CONC. PPT
0
START
TIME: 1259
14
640
CONC. PPT
0
START
TIME: 1404
TEST 1

Figure 147.

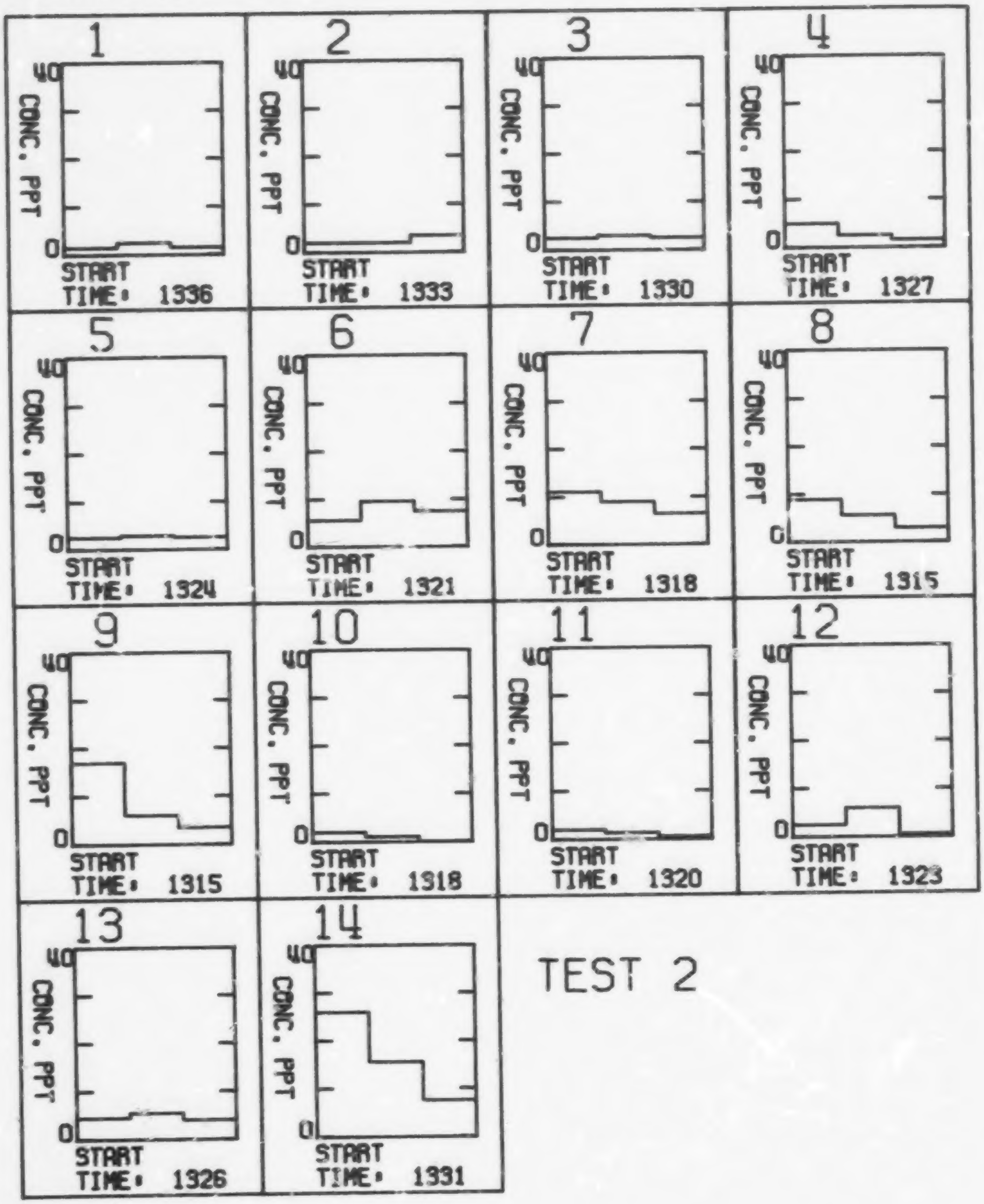
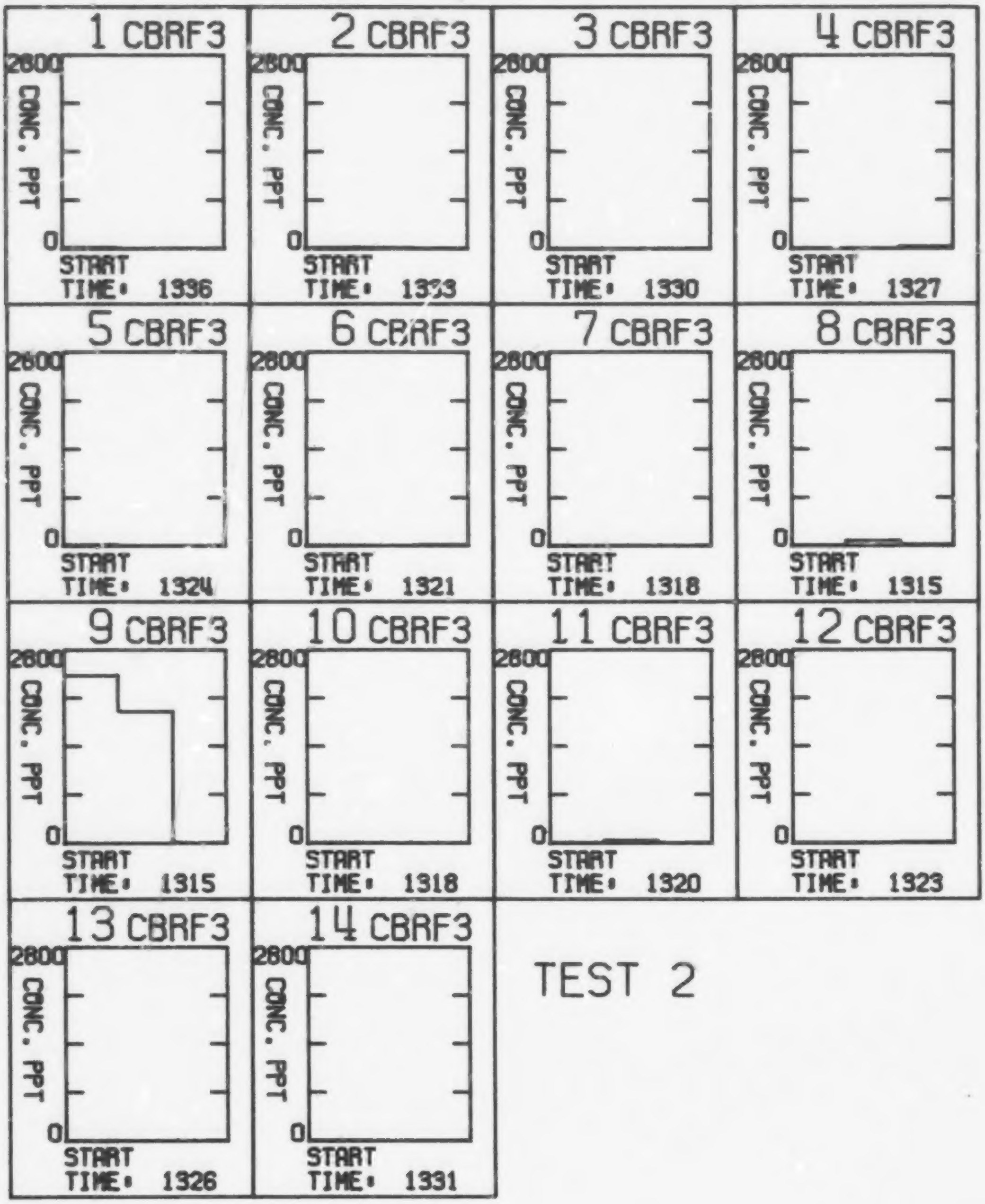

1
40
CONC. PPT
0
START TIME: 1336
2
START TIME: 1333
3
START TIME: 1330
4
START TIME: 1327
5
START TIME: 1324
6
START TIME: 1321
7
START TIME: 1318
8
START TIME: 1315
9
START TIME: 1315
10
START TIME: 1318
11
START TIME: 1320
12
START TIME: 1323
13
START TIME: 1326
14
START TIME: 1331
TEST 2

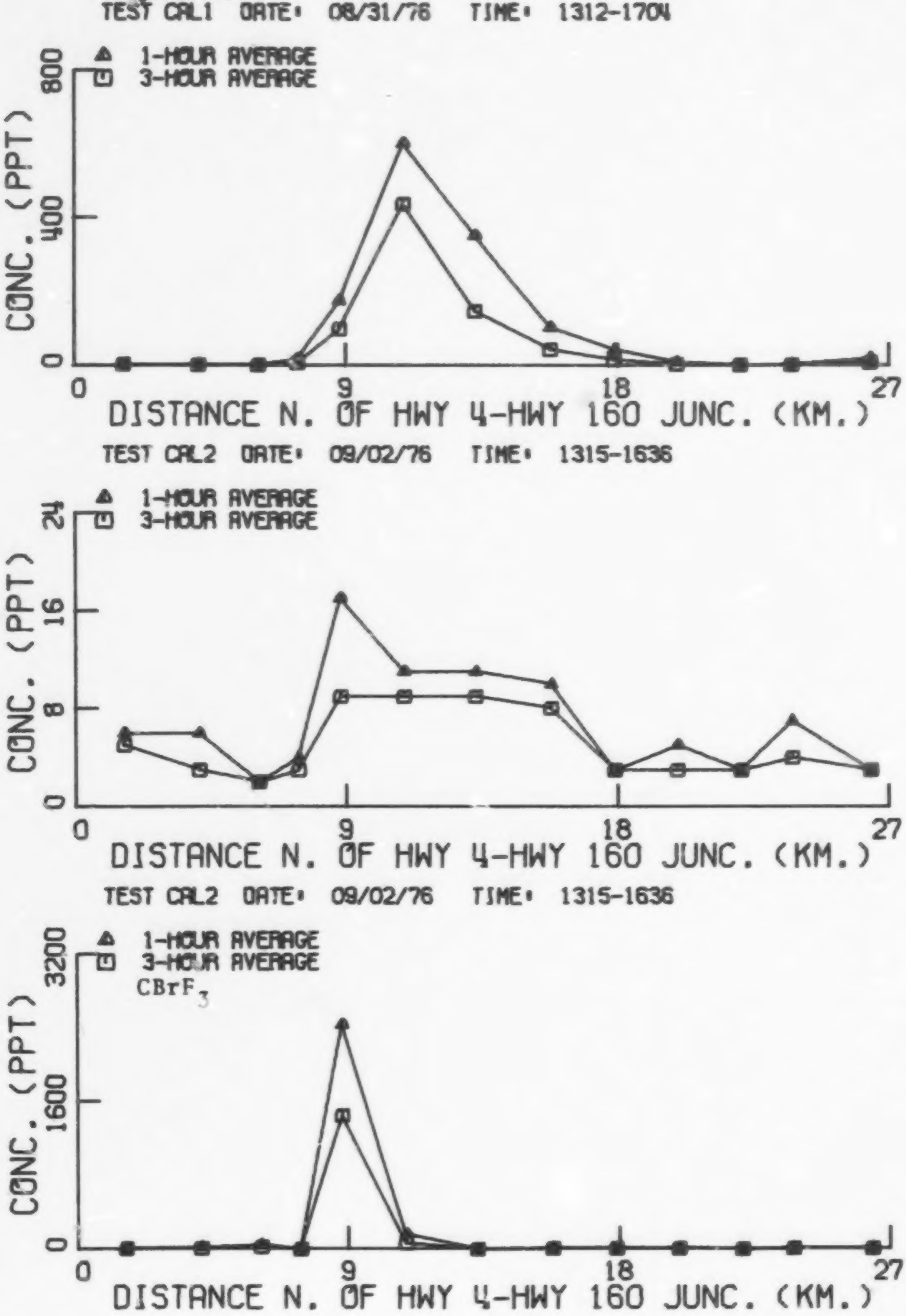
Figure 148.


1 CBRF3
2800
CONC. PPT
0
START
TIME: 1336
2 CBRF3
2800
CONC. PPT
0
START
TIME: 1333
3 CBRF3
2800
CONC. PPT
0
START
TIME: 1330
4 CBRF3
2800
CONC. PPT
0
START
TIME: 1327
5 CBRF3
2800
CONC. PPT
0
START
TIME: 1324
6 CBRF3
2800
CONC. PPT
0
START
TIME: 1321
7 CBRF3
2800
CONC. PPT
0
START
TIME: 1318
8 CBRF3
2800
CONC. PPT
0
START
TIME: 1315
9 CBRF3
2800
CONC. PPT
0
START
TIME: 1315
10 CBRF3
2800
CONC. PPT
0
START
TIME: 1318
11 CBRF3
2800
CONC. PPT
0
START
TIME: 1320
12 CBRF3
2800
CONC. PPT
0
START
TIME: 1323
13 CBRF3
2800
CONC. PPT
0
START
TIME: 1326
14 CBRF3
2800
CONC. PPT
0
START
TIME: 1331
TEST 2

3.9 Hourly Averaged Crosswind Tracer Concentrations

The maximum hourly and 3-hourly averaged tracer concentrations obtained with the sequential samplers have been plotted as functions of crosswind distance in the following figures. Distances for the 3-hour sequential samplers were measured north from the intersection of Highway 4 and Route 160. Distances for the 12-hour sequential samplers located along Highway 99 were measured south from Station 3 (Sacramento) along a north-south line. The 3-hour averaged data were calculated from the maximum 3 hours of data which occurred during the test.

Figure 149.



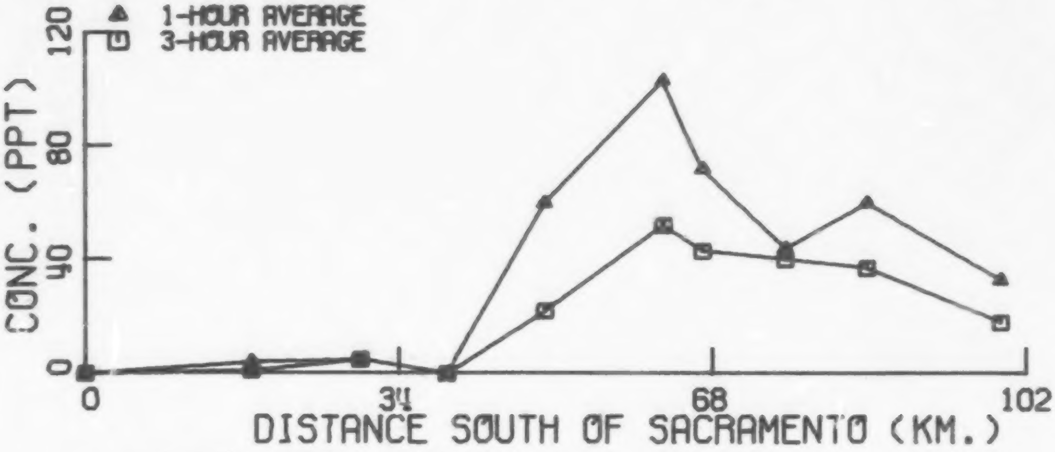
TEST CAL1 DATE: 08/31/76 TIME: 1312-1704

TEST CAL2 DATE: 09/02/76 TIME: 1315-1636

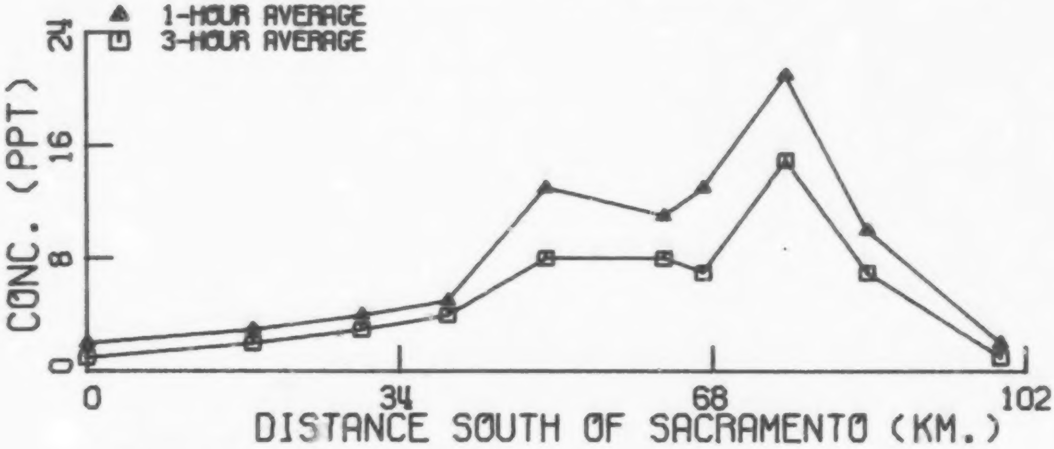
TEST CAL2 DATE: 09/02/76 TIME: 1315-1636

Figure 150.

TEST CAL1 DATE: 08/31/76 TIME: 1400-2200



TEST CAL2 DATE: 09/02/76 TIME: 1400-2000



TEST CAL3 DATE: 09/05/76 TIME: 0300-1000

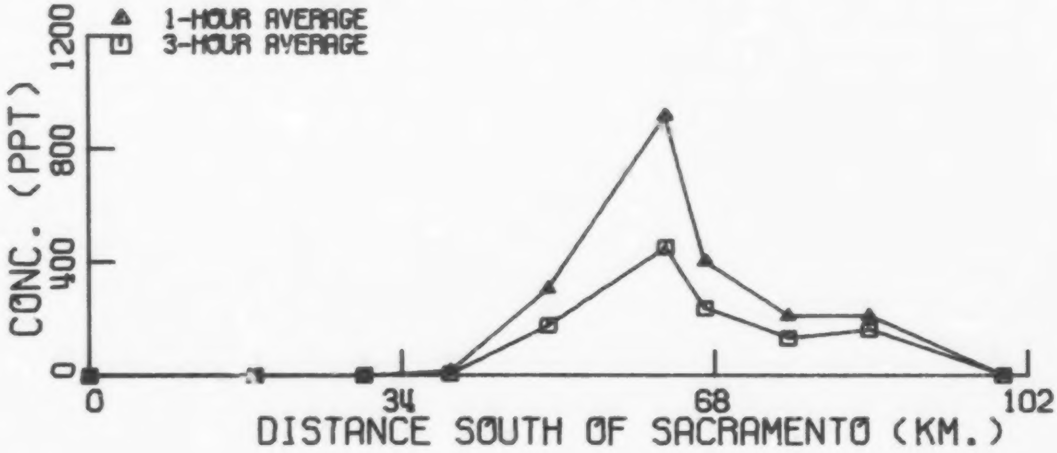
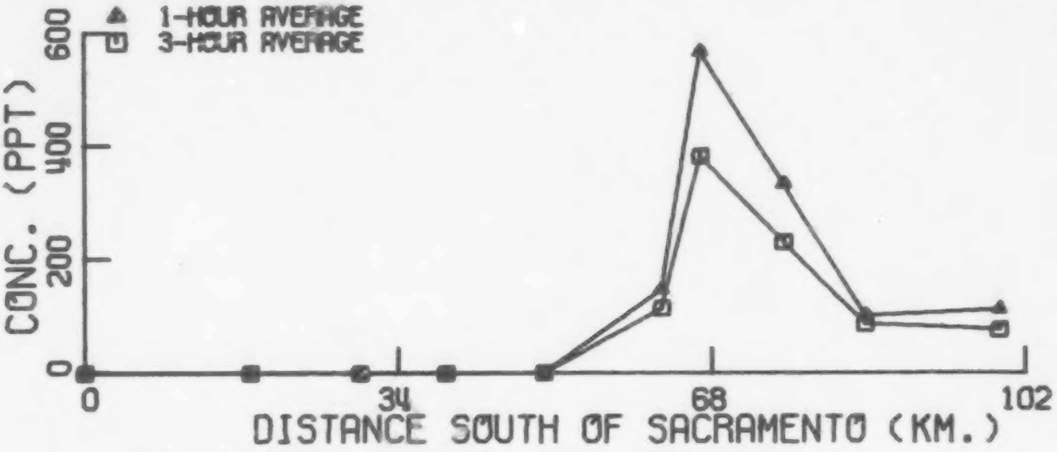
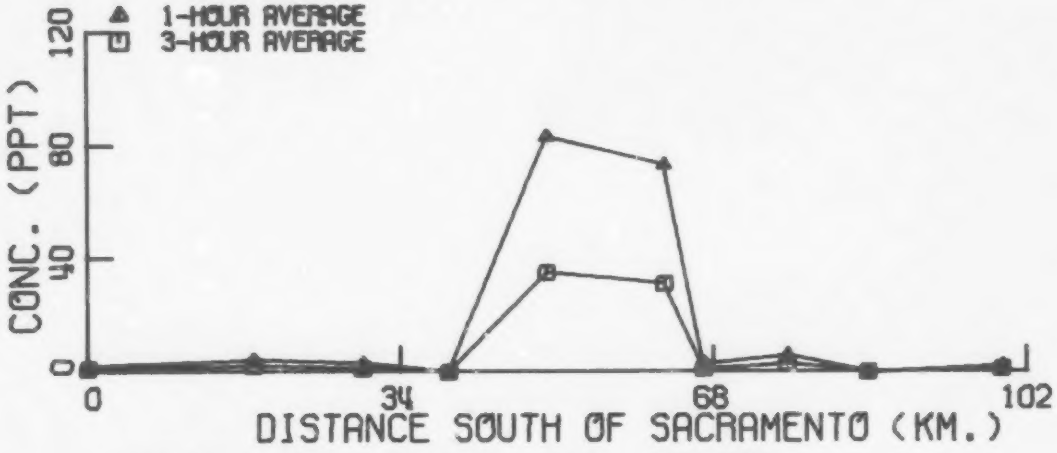


Figure 151.

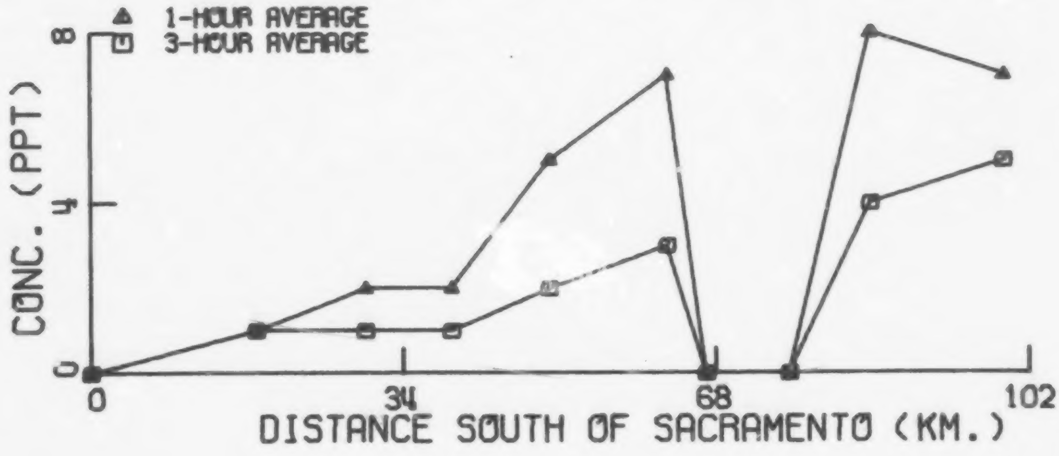
TEST CAL4 DATE: 09/06/76 TIME: 2000-0500



TEST CAL6 DATE: 09/10/76 TIME: 0700-1600



TEST CAL7 DATE: 09/13/76 TIME: 1800-0600



3.10 Mass Balance of Tracer Data

The integration of the automobile and airborne traverse data over the crosswind traverse distance can be used to determine the average flux of tracer gas passing through the traverse vertical plane. This flux can then be compared to the amount of tracer released at the source to provide a mass balance on the experimental data:

$$\%\ \text{tracer observed} = \frac{\int_{-\infty}^{\infty} \int_{0}^{L} u(z)\ C(y,z)\ dz\ dy}{Q} \cdot 100$$

where Q is the release rate, L is the height of the mixing layer, u(z) is the wind velocity, and C(y,z) is the tracer concentration. This expression may be simplified by assuming a constant wind velocity, $u(z) = \bar{u}$, and a uniform vertical tracer distribution, $C(z,y) = \bar{C}(y)$, over a height ℓ:

$$\%\ \text{tracer observed} = \bar{u} \sum_{i=1}^{n} \ell_i \left(\int_{-\infty}^{\infty} \bar{C}(y)\ dy \right)_i$$

where $\sum_{i}^{n} \ell_i$ equals the height of the mixing layer. In the following calculations, u was obtained by vector averaging the available wind data from points downwind of the source, and L was also averaged from available data. For cases where only surface tracer data were available, n=1 and ℓ=L; the tracer was assumed to be vertically well-mixed from the surface to the height of the mixing layer. Where traverse data were available at more than one height, n was taken to be equal to the number of traverses and ℓ_i was taken to be a height arbitrarily assigned to each crosswind traverse. In this case, the tracer was assumed to be vertically well-mixed over a discrete portion of the mixing layer. The average wind speed, mixing height and percent tracer observed in traverses where the assumptions were considered reasonable are given in Table 8.

If one assumes 100% of the tracer was observed and the average wind speed is correct, it is possible to calculate a new height based upon the tracer data. Similarly, if the mixing height is assumed correct, an average wind speed can be predicted from the tracer data:

$$L_{pred} = L \cdot \frac{\%\ \text{observed}}{100\%}$$

$$u_{pred} \quad u \cdot \frac{\%\ \text{observed}}{100\%}$$

The results of these calculations are also given in Table 8.

TABLE 8

TRACER MASS BALANCE RESULTS

Trav	Time	X (km)	L (m)	u (m/sec)	% tracer observed	L_{pred} (m)	u_{pred} (m/sec)
Test 1 (8/31/76)							
7*	1701-1753	51.9	1600	295/3.5	204	784	1.7
Test 2 (9/2/76)							
4*	1400-1415	35.2	780	290/6.2	36	2167	17.2
4	1400-1415	10.7	780	290/6.2	74($CBrF_3$)	1053	8.4
5*	1445-1503	34.1	980	290/6.2	20	4900	31.0
5	1400-1415	10.0	980	290/6.2	134($CBrF_3$)	731	4.6
6*	1515-1530	32.8	980	290/6.8	14	7000	49
7	1545-1635	25.3	1180	290/5.4	239	494	2.3
9*	1630-1715	70.9	1500	290/4.6	110	1364	4.2
10*	1630-1737	67.4	1500	300/4.2	121	1240	3.5
10	1630-1737	57.0	1500	300/4.2	331($CBrF_3$)	416	1.2
11*	1731-1815	73.5	1500	290/4.8	250	600	1.9
				AVE.	136		
Test 3 (9/5/76)							
3	0213-0259	51.7	700	280/6.2	774	90	0.8
8	0414-0545	47.4	690	280/4.7	649	106	0.7
10	0432-0517	39.5	700	270/5.2	558	125	0.9
14*	0637-0647	37.2	740	306/3.3	118	627	2.8
				AVE.	525		

---

* Traverse data indicate that only a portion of the plume was traversed.

TABLE 8 (cont.)

TRACER MASS BALANCE RESULTS

Trav	Time	X (km)	L (m)	u (m/sec)	% tracer observed	L_{pred} (m)	u_{pred} (m/sec)
Test 4 (9/6/76)							
2	2130-2217	50.9	600	280/4.4	515	117	0.9
4	2200-2248	50.9	600	270/4.6	440	136	1.0
6	2232-2320	54.5	570	270/4.6	400	143	1.2
7	2315-2400	58.8	545	300/3.8	307	178	1.2
				AVE.	416		
Test 5 (9/9/76)							
1	1255-1315	9.4	3000	31/1.8	198	1515	0.9
2	1314-1330	9.4	3000	31/1.8	189	1587	1.0
4*	1351-1405	17.7	3000	9/1.1	66	4545	1.7
5*	1356-1428	24.3	3000	338/0.8	47	6383	1.7
6	1359-1416	10.6	3000	252/1.0	195	1538	0.5
7	1413-1426	18.5	3000	338/0.8	53	5660	1.5
8	1436-1450	18.6	3000	338/0.8	61	4918	1.3
				AVE.	116		
Test 6 (9/10/76)							
3*	1001-1051	47.6	540	115/1.1	3	18000	37
5*	1030-1115	47.6	810	272/1.1	4	20000	28
8*	1106-1203	45.8	930	270/2.1	7	13000	30
Airborne							
4	1044-1052	37.2	810	260/5.5	89	909	6.2
10	1000-1039	43.3	540	260/5.5	15	3666	37
12	1200-1239	43.8	1200	270/3.0	21	5669	14
				AVE.	23		

TABLE 8 (cont.)

TRACER MASS BALANCE RESULTS

Trav	Time	X (km)	L (m)	u (m/sec)	% tracer observed	L_{pred} (m)	u_{pred} (m/sec)
Test 7 (9/13/76)							
1	0924-0956	15.3	300	230/1.5	95	316	1.6
3	1113-1217	50.7	1475	290/3.0	160	922	1.9
4*	1130-1146	22.0	400	290/2.8	70	571	4.0
6	1340-1414	22.4	1500	230/1.3	151	993	0.9
7	1429-1451	47.4	1100	310/4.1	33	3333	12.4
8	1450-1706	54.7	1500	270/4.5	243	617	1.9
9	1458-1522	52.7	960	280/3.6	7	14000	51
10	1537-1611	22.9	1500	280/3.5	56	2679	6.3
11*	1654-1820	65.9	545	260/4.5	24	2271	18.7
12*	1835-1901	42.8	500	260/4.8	30	1667	16.0
				AVE.	87		
Airborne							
6	0945-0958	17.1	300	310/0.9	8	3807	11.4
8	1327-1343	61.6	$244=\ell_1$	280/1.7	4		
9	1348-1404	61.4	$122=\ell_2$	280/1.7	3	113 total	
11	1428-1456	61.7	$\underline{2134=\ell_3}$ L=2500	290/1.3	106	2212	1.5
12	1759-1812	72.7	2500	280/4.2	120	2079	3.5
				AVE.	80		

TABLE 8 (cont.)

TRACER MASS BALANCE RESULTS

Trav	Time	X (km)	L (m)	u (m/sec)	% tracer observed		L_{pred} (m)	u_{pred} (m/sec)
Test 8 (9/14/76)								
1	0906-0931	14.4	350	270/2.2	110		318	2.0
2	0941-1007	15.7	480	270/2.2	61		787	3.6
3	1047-1151	48.9	800	240/4.2	168		476	2.5
4	1154-1218	18.4	300	270/3.1	13		2308	23.8
				AVE.	88			
Airborne								
3	0858-0911	17.4	350	270/3.6	18		1951	20.1
4	0942-0955	17.4	$114=\ell_1$	220/3.6	2	102 total		
5	0959-1012	17.2	$122=\ell_2$	190/6.3	20			
6	1016-1028	17.2	$244=\ell_3$	190/6.3	80		471	6.2
			L=480	AVE.	60			

Overall Average: 154% of tracer
observed in 51 crosswind traverses

With Tests 3 and 4 omitted,
Overall Average: 95% of tracer
observed in 43 crosswind traverses

3.11 Crosswind Horizontal and Vertical Standard Deviations as Functions of Downwind Distance

The horizontal dispersion parameter σ_y is usually related to downwind distance, X, in terms of dispersion coefficients, a and b:

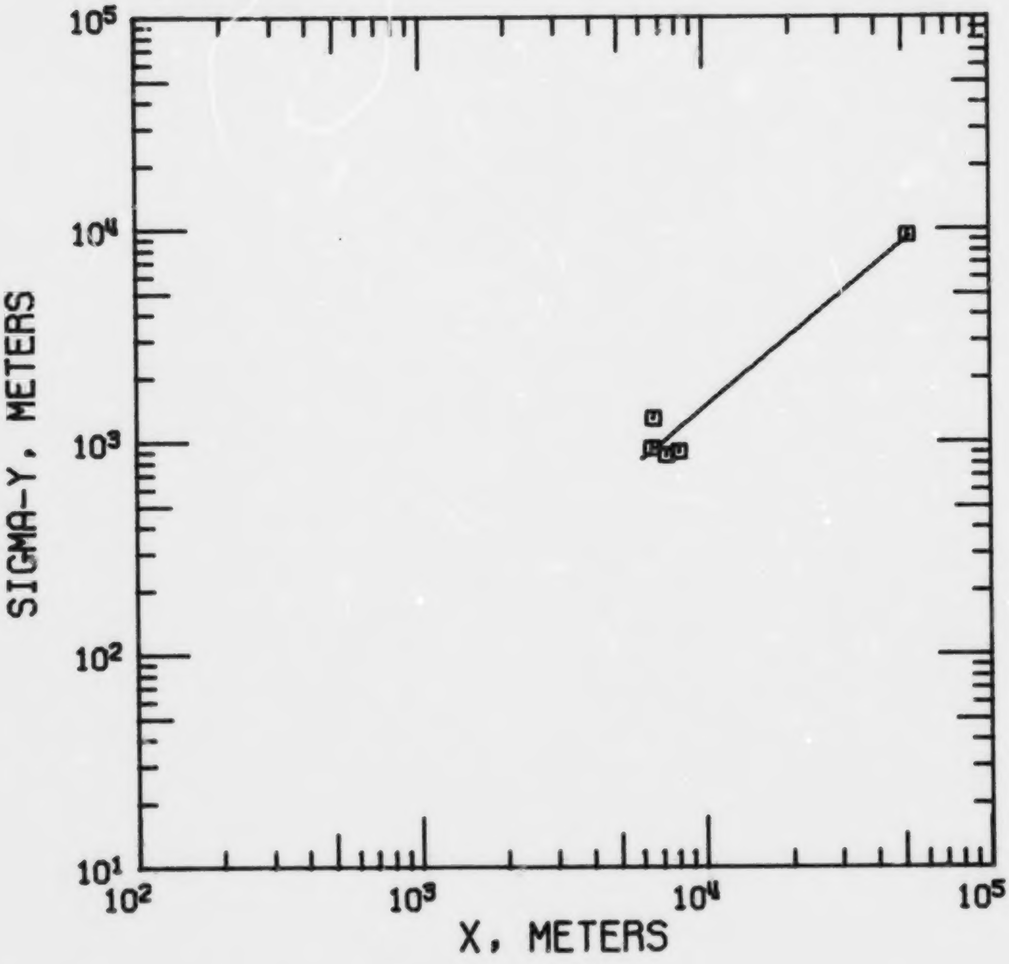
$$\sigma_y = a\ X^b.$$

The values of a and b can be determined from the Gaussian best-fit results for the automobile traverse tracer data. If σ_y versus X is plotted, a linear least-squares best-fit of the data yields the coefficients a and b. The data and corresponding best-fit lines are shown in the following figures for each release site, each test, and for each of four meteorological periods; the values of a, b and the standard deviation of the least-squares fit for the curves are given in Table 9. The meteorological periods are based on the typical wind patterns and mixing layer heights which prevail in the region during the summer months. The four periods and the times of occurrence are Pre-Sea Breeze (0600-1100), Sea Breeze (1300-1800), Sea Breeze Tail (1900-0000), and Nighttime (0000-0500). The vertical dispersion parameter σ_z can be written

$$\sigma_z = c\ X^d.$$

The results of the linear best-fit of σ_z versus X data are shown in the following figures; values of c and d are given in Table 10.

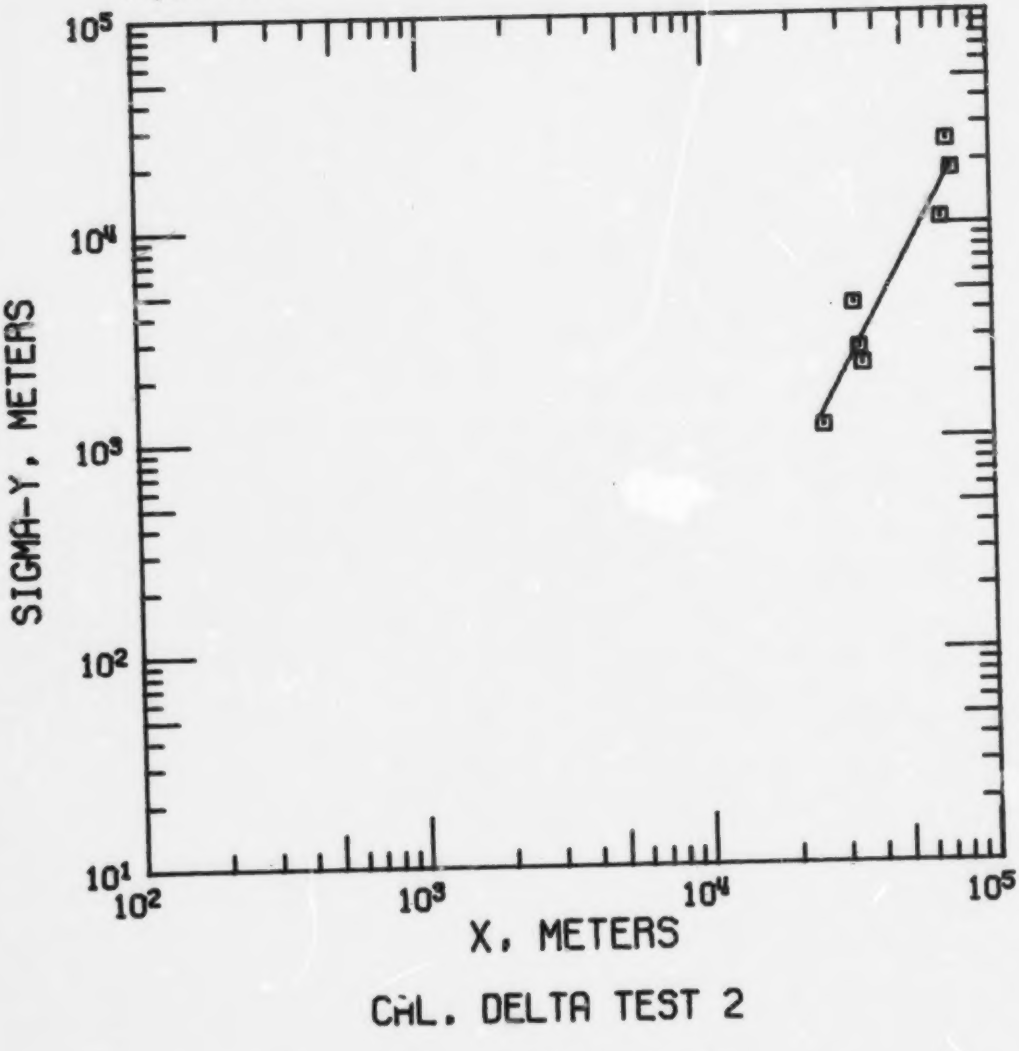
Figure 152.



CAL. DELTA TEST 1

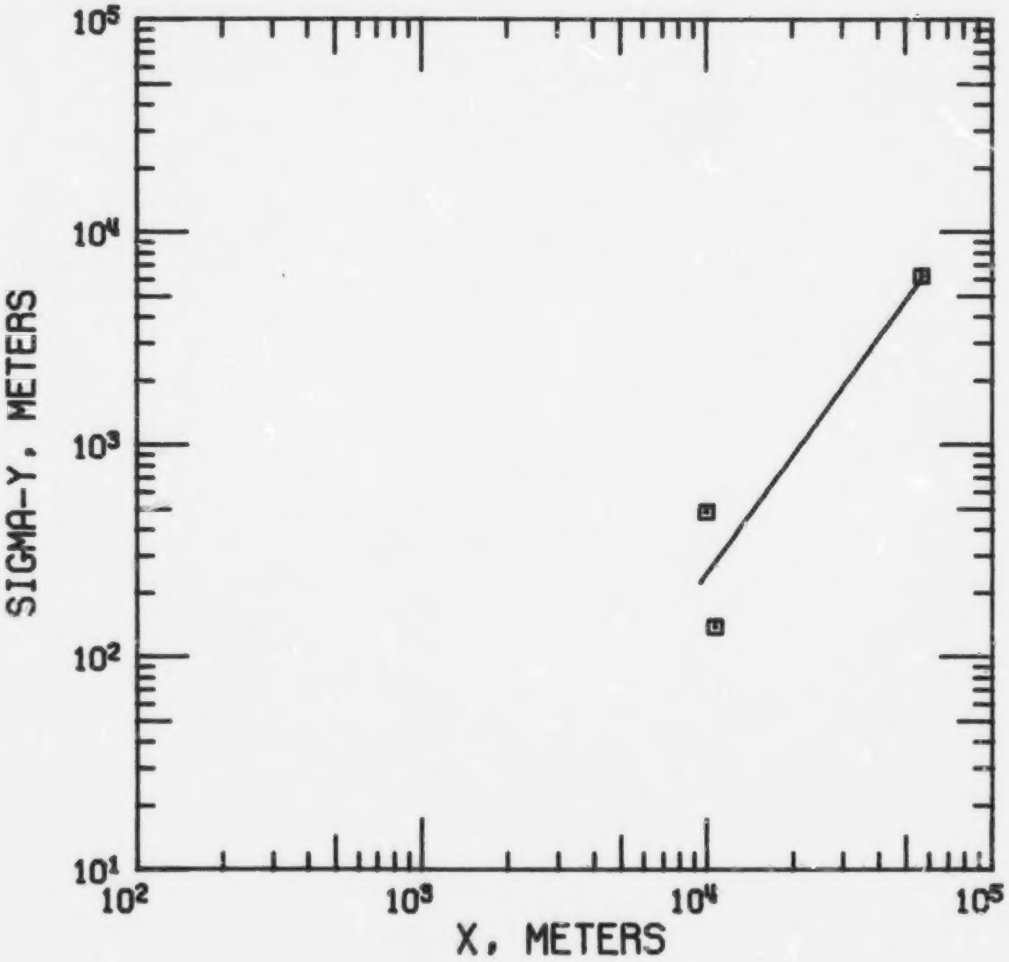
Dow Auto Traverse

Figure 153.



Martinez Auto Traverse

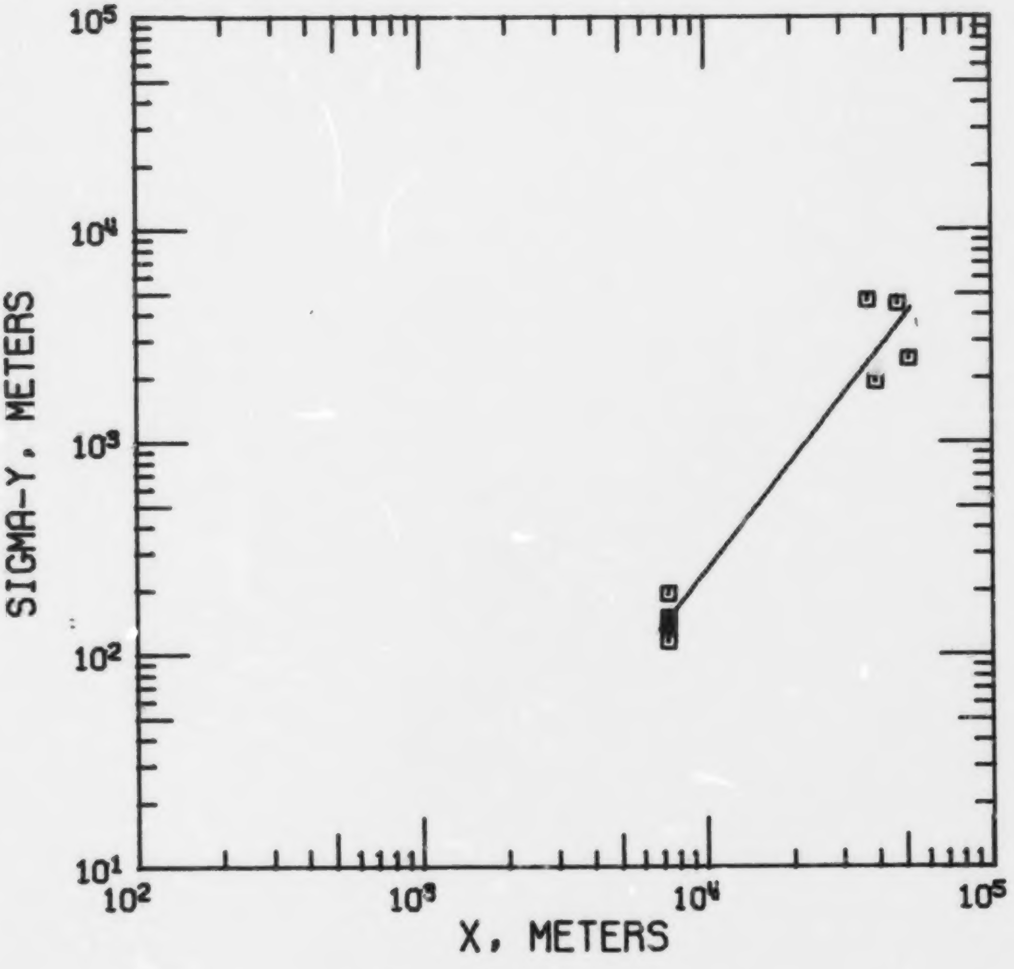
Figure 154.



CAL. DELTA TEST 2

Dow Auto Traverse

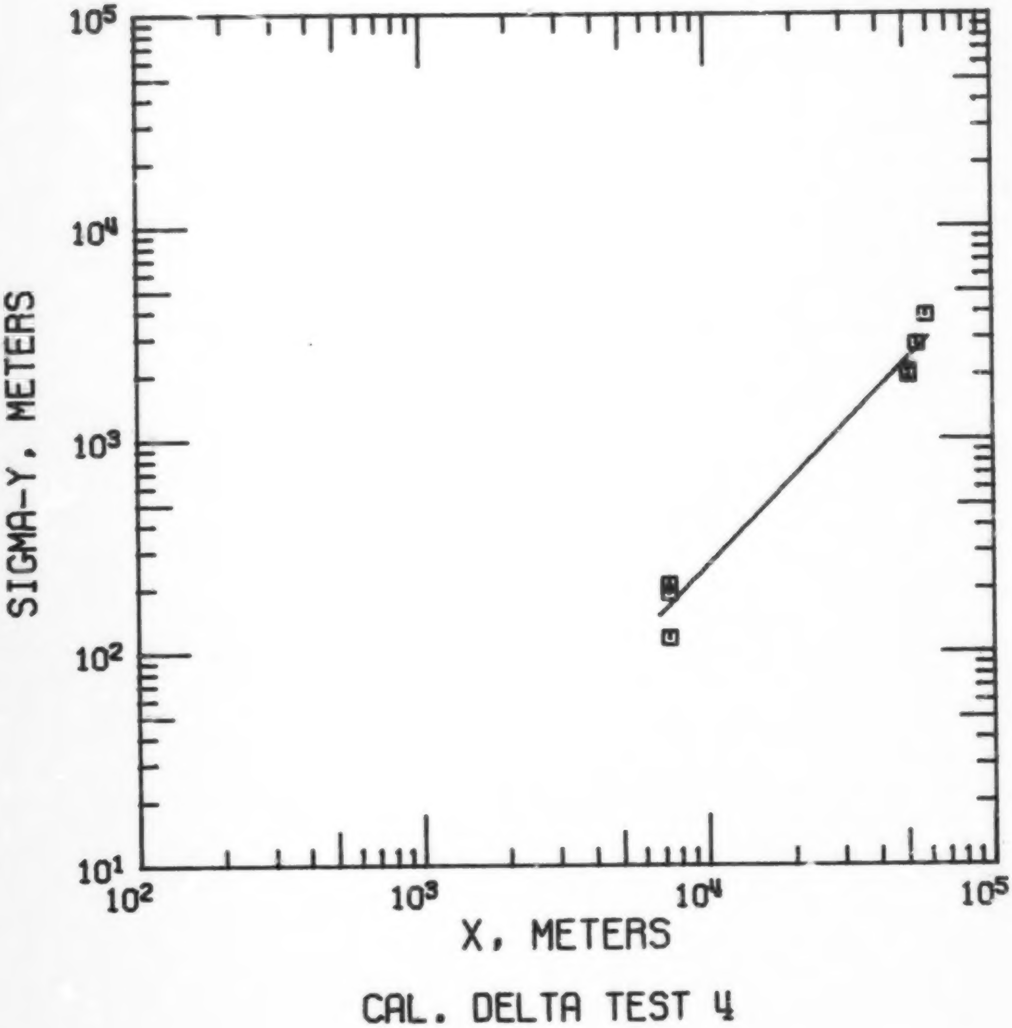
Figure 155.



CAL. DELTA TEST 3

Dow Auto Traverse

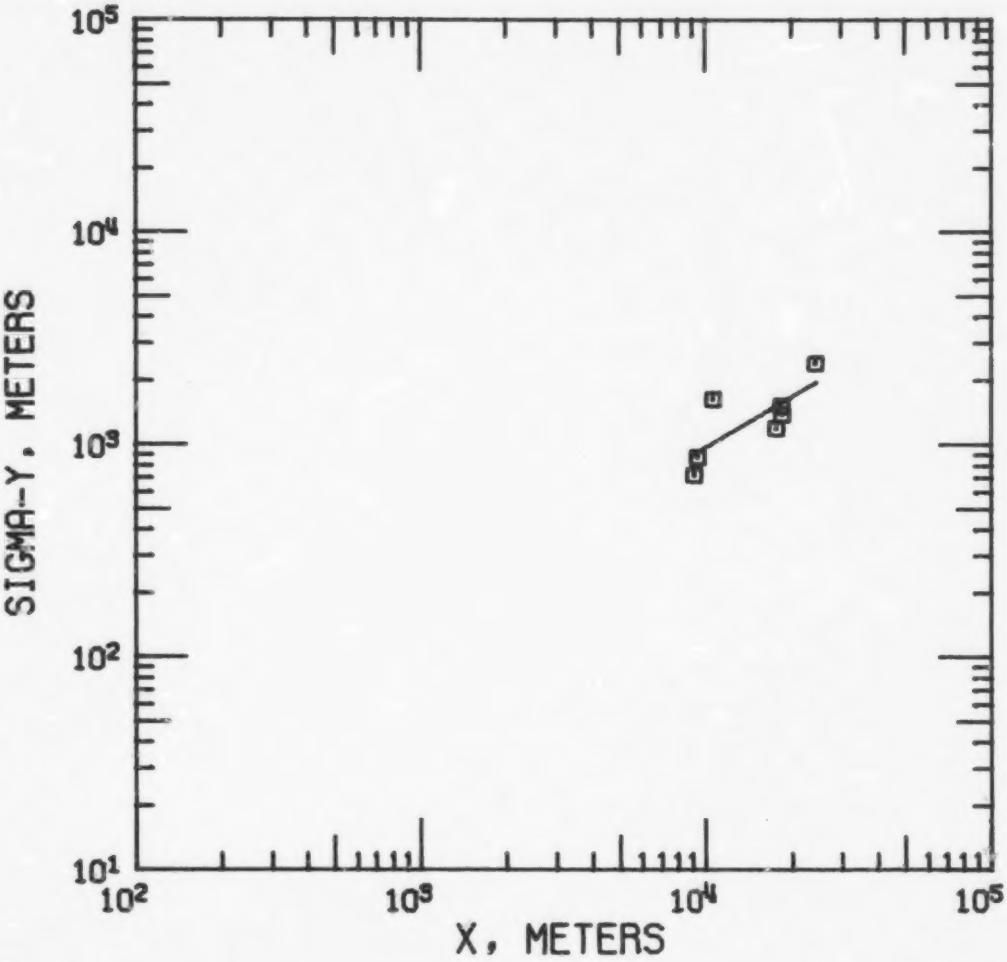
Figure 156.



CAL. DELTA TEST 4

Dow Auto Traverse

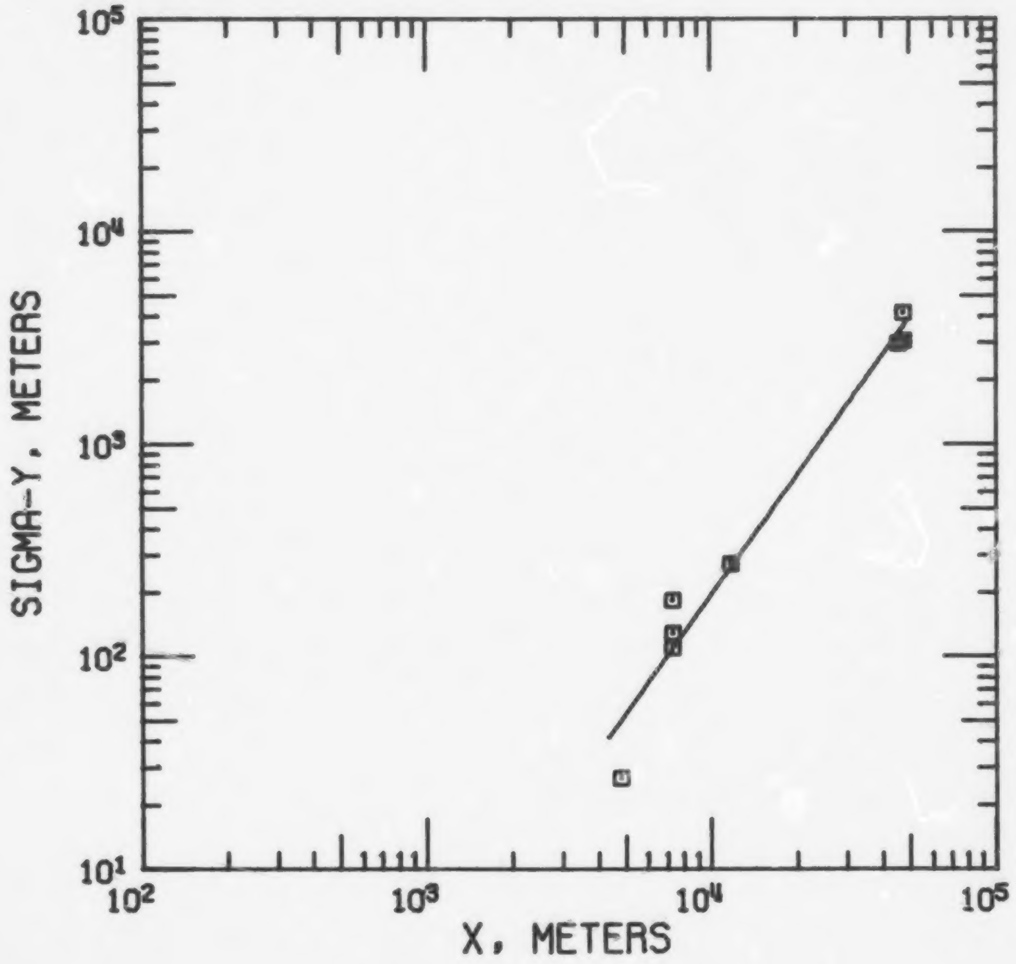
Figure 157.



CAL. DELTA TEST 5

Dow Auto Traverse

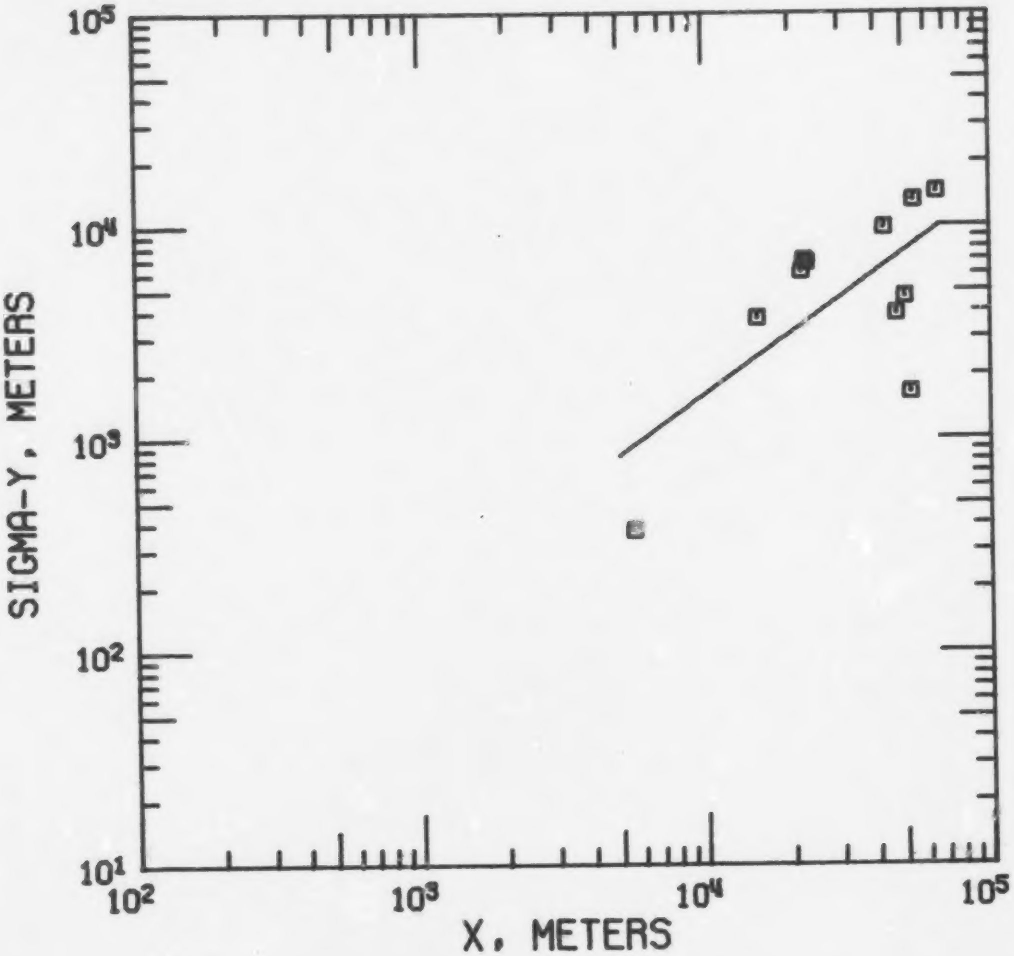
Figure 158.



CAL. DELTA TEST 6

Dow Auto Traverse

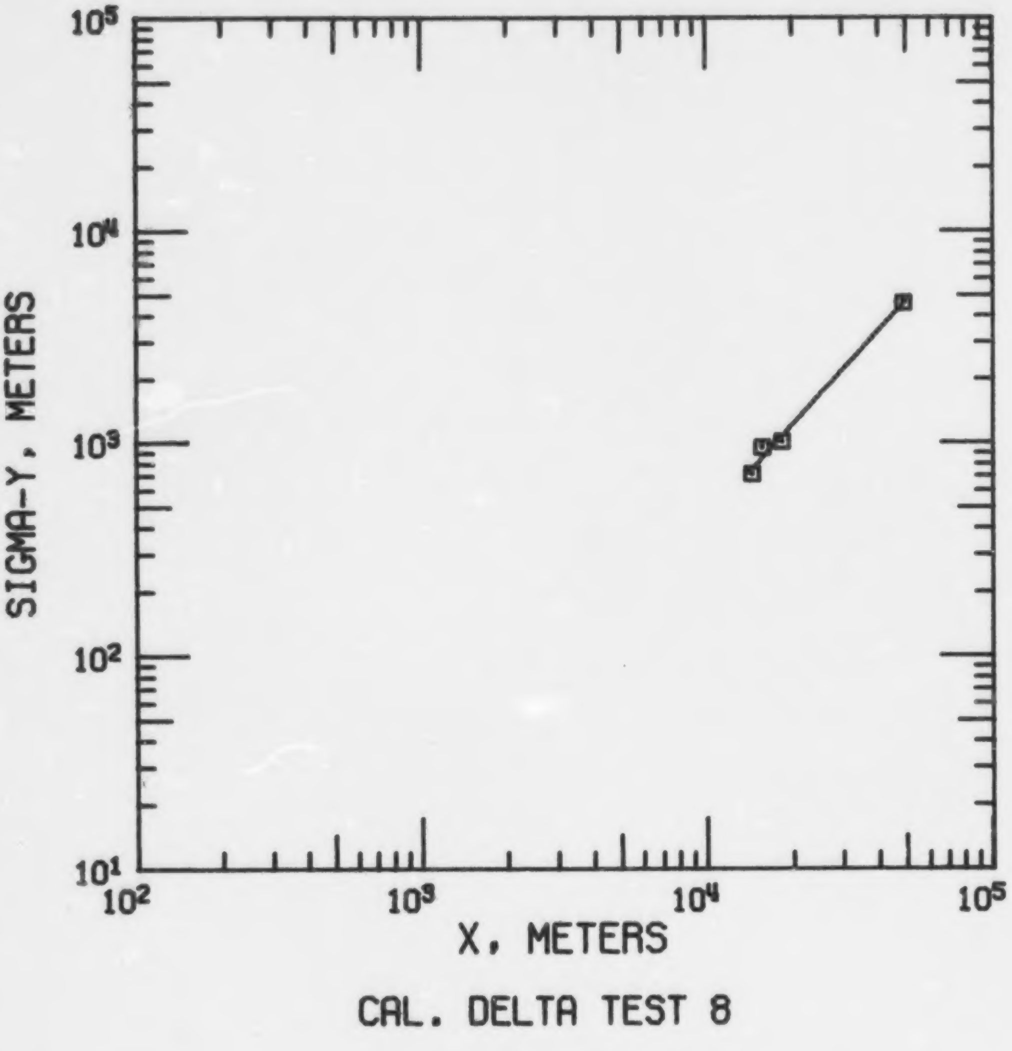
Figure 159.



CAL. DELTA TEST 7

Pinole Auto Traverse

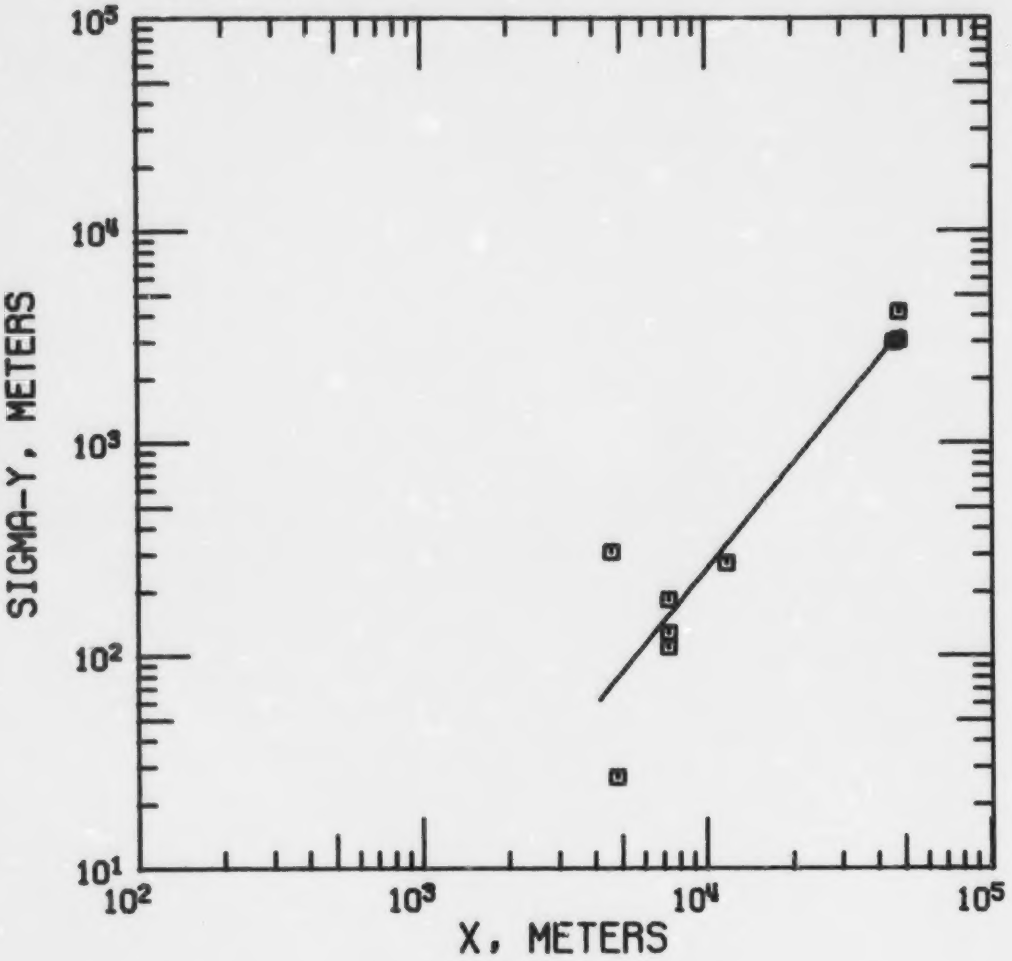
Figure 160.



CAL. DELTA TEST 8

Pinole Auto Traverse

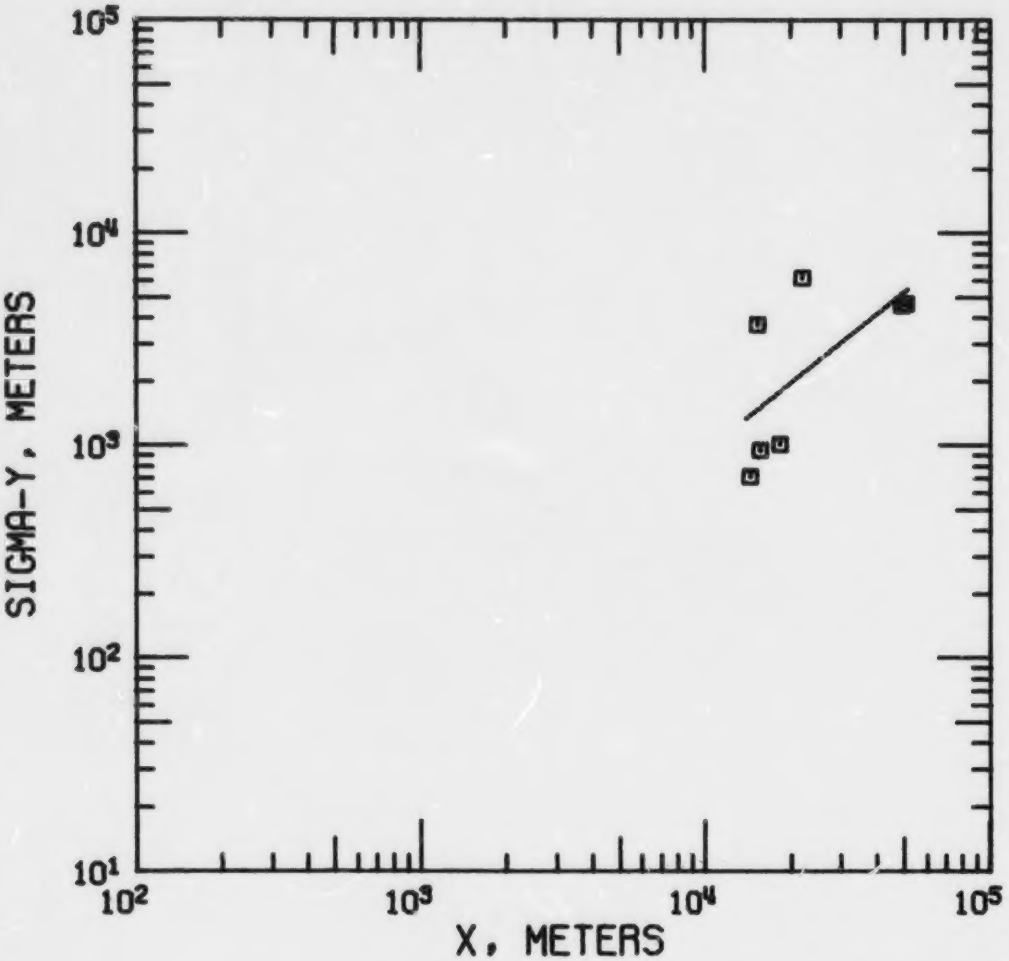
Figure 161.



PRE-SEA BREEZE

Dow Auto Traverse

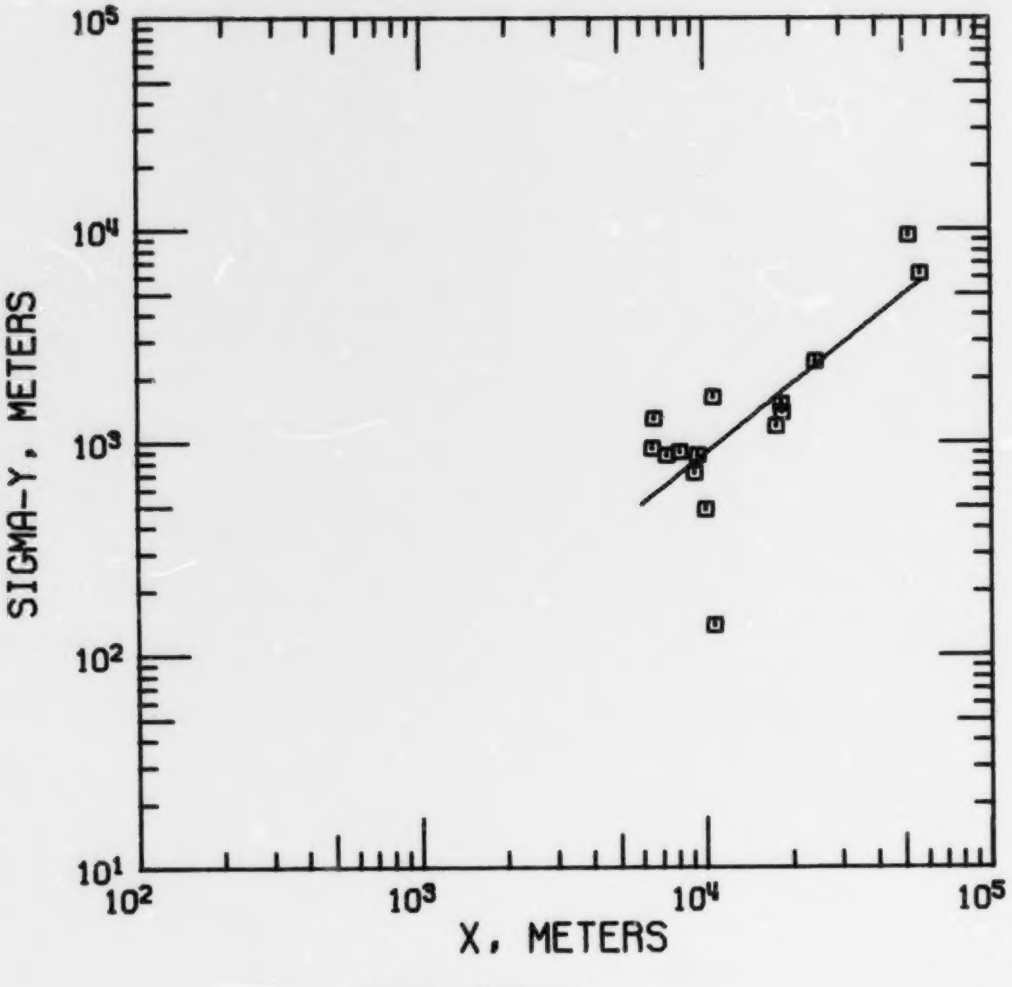
Figure 162.



PRE-SEA BREEZE

Pinole Auto Traverse

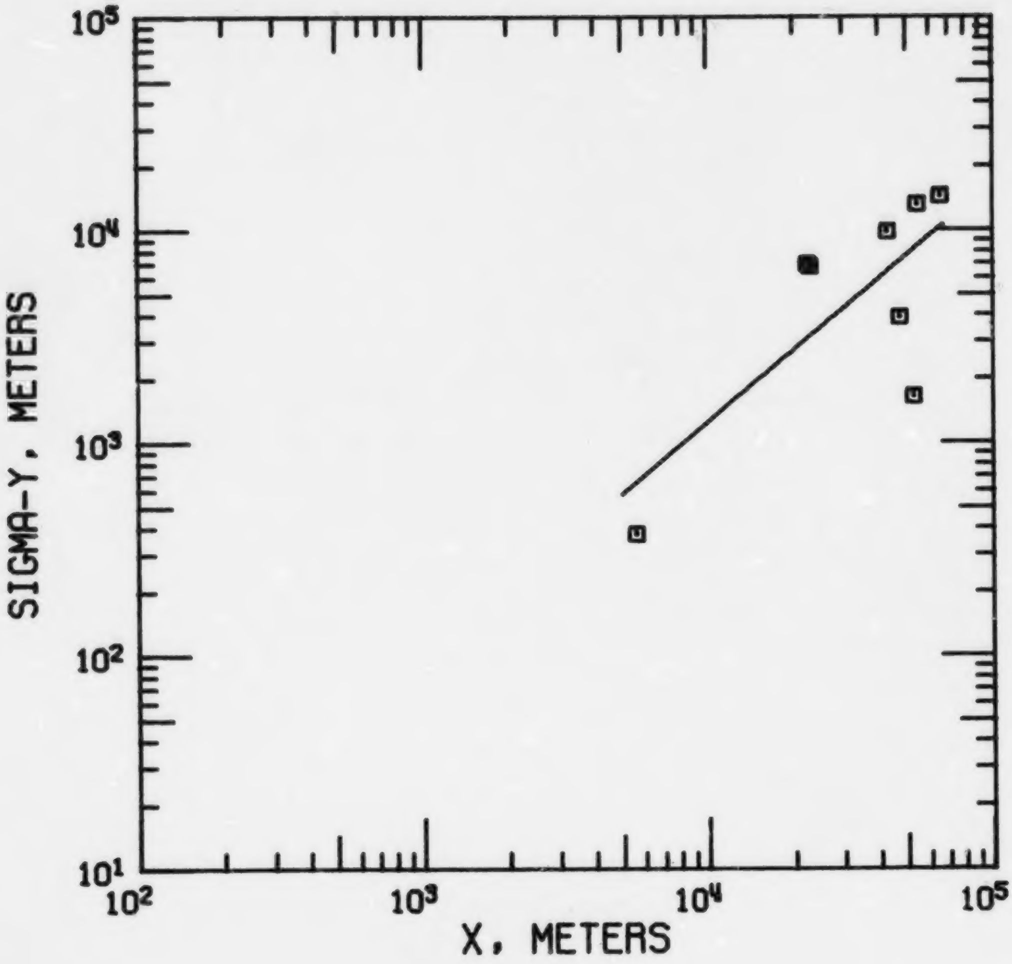
Figure 163.



SEA BREEZE

Dow Auto Traverse

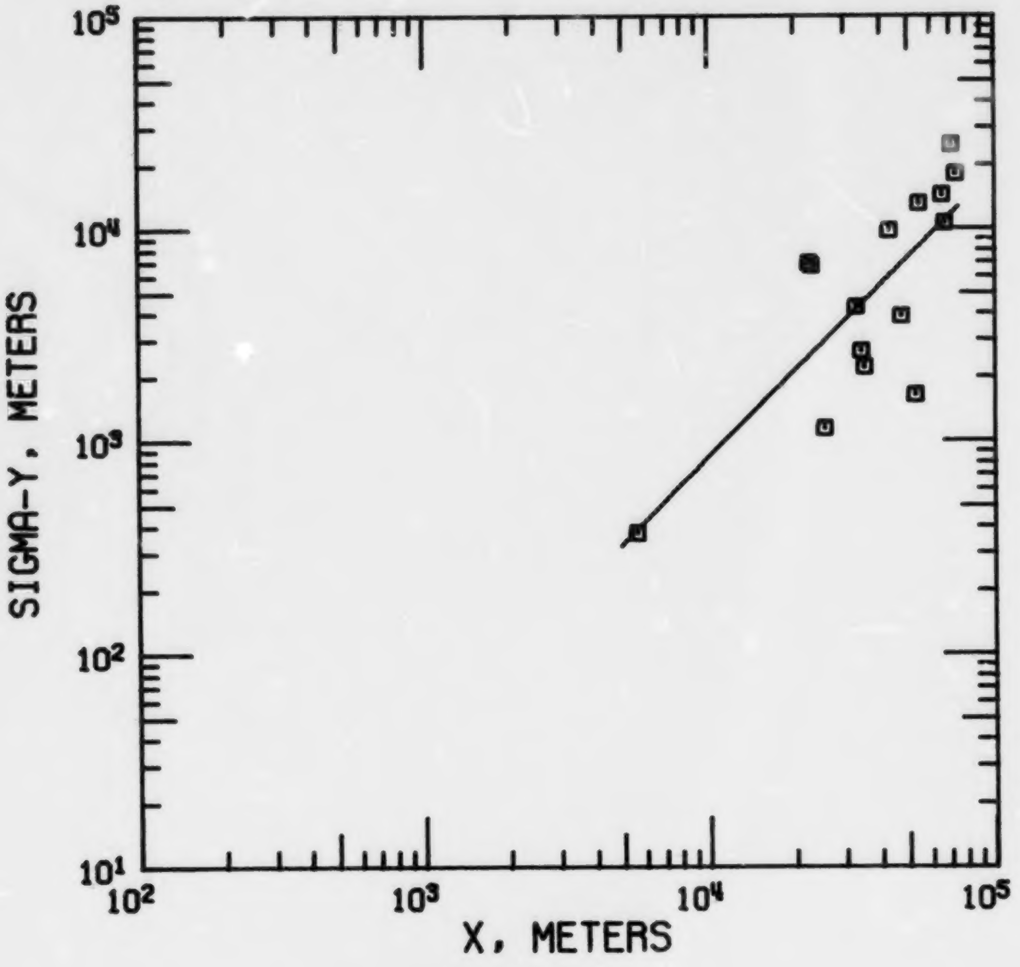
Figure 164.



SEA BREEZE

Pinole Auto Traverse

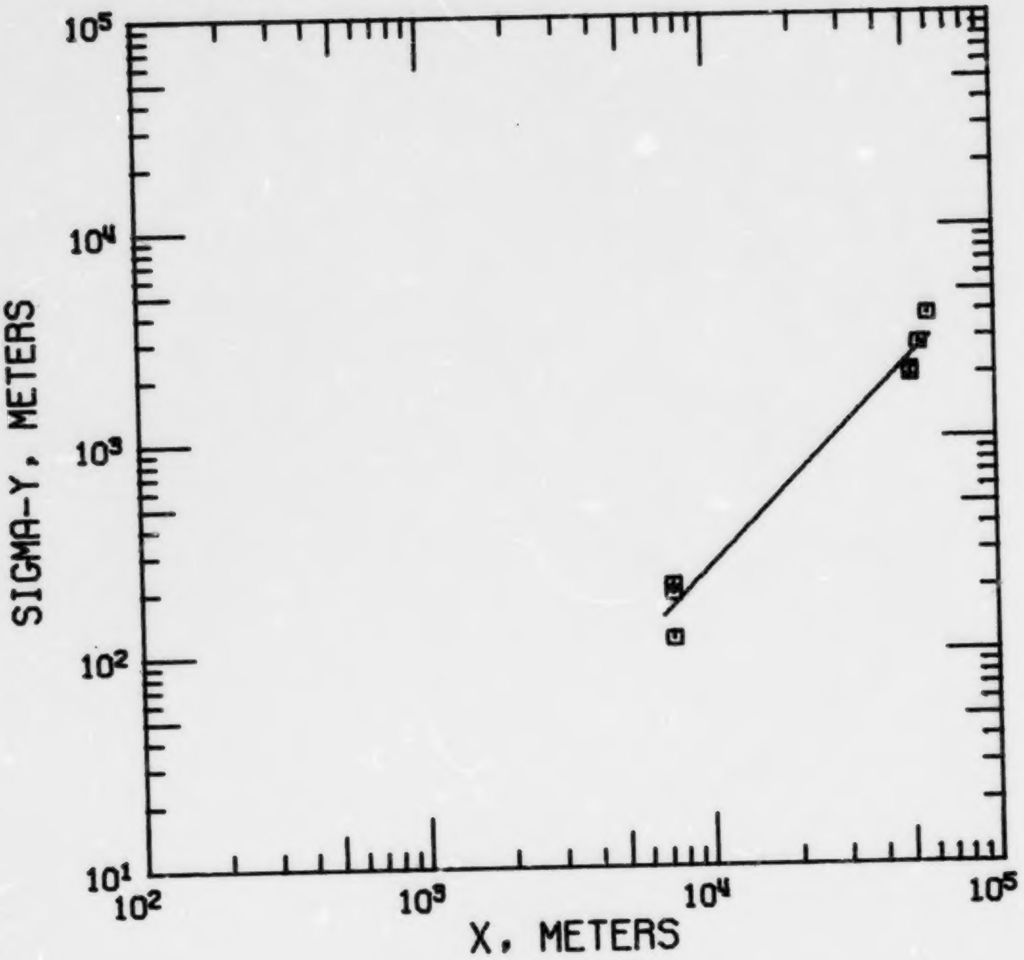
Figure 165.



SEA BREEZE

Pinole-Martinez Auto Traverse

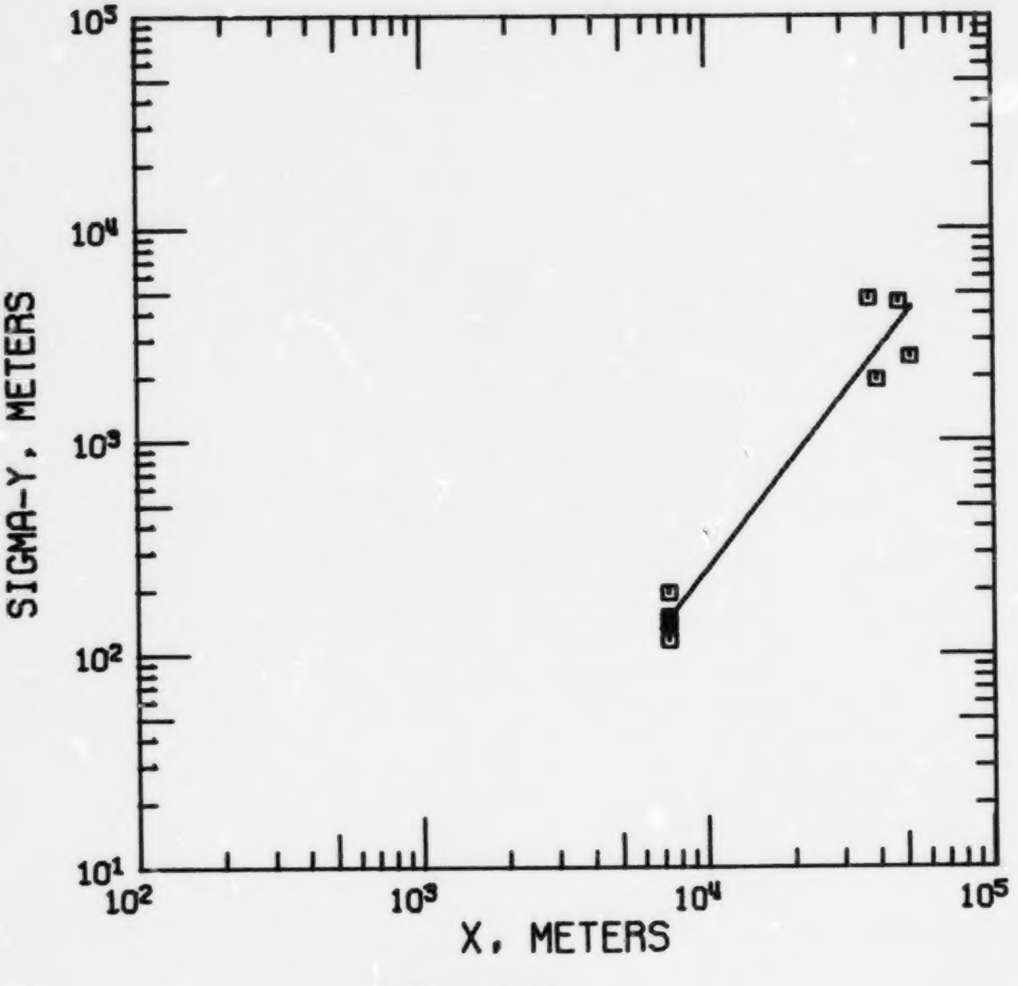
Figure 166.



SEA BREEZE TAIL

Dow Auto Traverse

Figure 167.



NIGHTTIME

Dow Auto Traverse

TABLE 9

HORIZONTAL CROSSWIND DISPERSION COEFFICIENTS

$\sigma_y = a\,X^b$

Test, Release Point	a m^{1-b}	b	σ (std. dev. about best-fit line)* (m)
Test 1, Dow	$5.31 \cdot 10^{-2}$	1.11	284
Test 2, Dow	$1.12 \cdot 10^{-5}$	1.84	230
Test 2, Martinez	$1.31 \cdot 10^{-8}$	2.50	3710
Test 3, Dow	$3.71 \cdot 10^{-5}$	1.71	1030
Test 4, Dow	$8.17 \cdot 10^{-4}$	1.37	428
Test 5, Dow	$7.09 \cdot 10^{-1}$	0.784	362
Test 6, Dow	$6.52 \cdot 10^{-6}$	1.87	331
Test 7, Dow	-	-	
Test 7, Pinole	$2.40 \cdot 10^{-1}$	0.958	3850
Test 8, Pinole	$5.33 \cdot 10^{-4}$	1.48	75

$$* \ \sigma = \left[\frac{\sum_{i=1}^{n} (\sigma_{y_i} - \sigma_y)^2}{n-1}\right]^{\frac{1}{2}}$$ where σ_{y_i} are the data points and $\sigma_y = aX^b$

- -

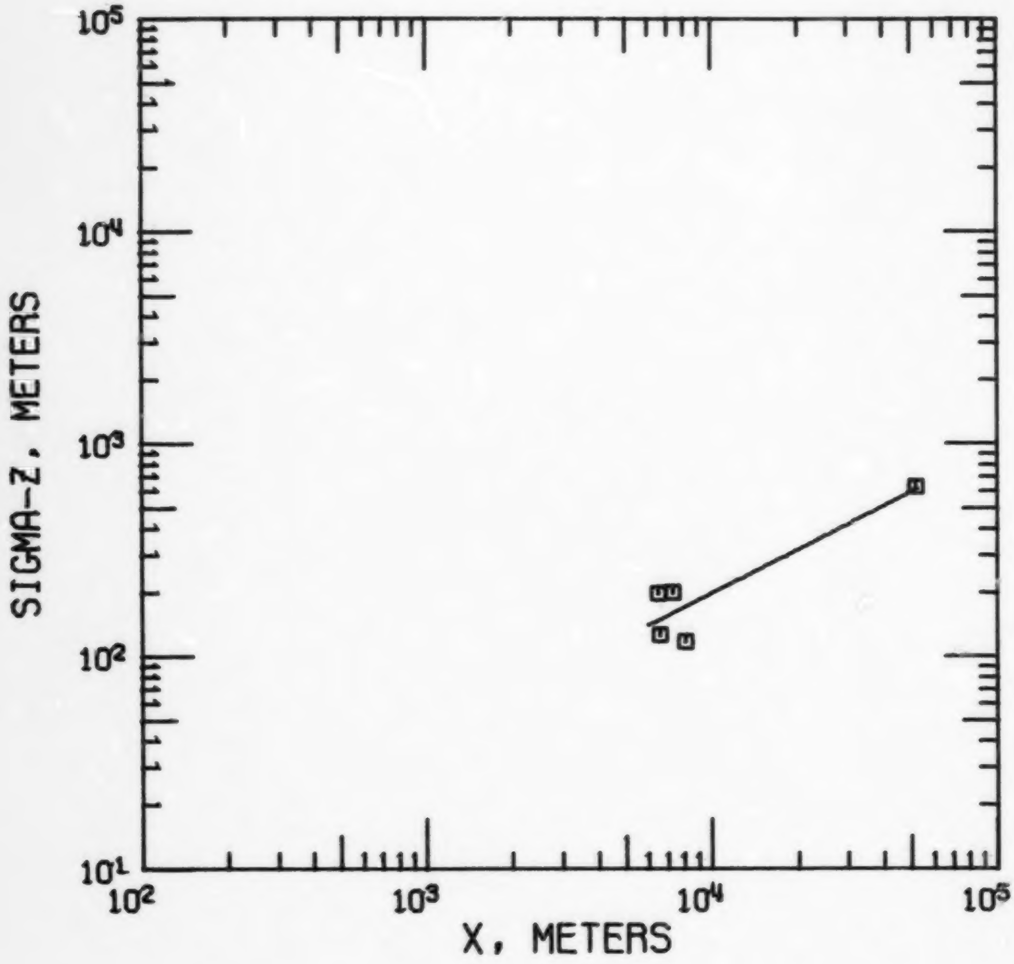
Meteorological Period, Release Point	a	b	σ (m) (std. dev. about best-fit line)
Pre-Sea Breeze, Dow	$8.34 \cdot 10^{-5}$	1.62	344
Pre-Sea Breeze, Pinole	$4.54 \cdot 10^{-2}$	1.08	1960
Sea Breeze, Dow	$4.74 \cdot 10^{-2}$	1.07	1230
Sea Breeze, Martinez	$1.31 \cdot 10^{-8}$	2.50	3710
Sea Breeze, Pinole	$4.06 \cdot 10^{-2}$	1.12	4330
Sea Breeze, Pinole & Martinez	$3.57 \cdot 10^{-3}$	1.34	5050
Sea Breeze Tail, Dow	$8.17 \cdot 10^{-4}$	1.37	428
Nighttime, Dow	$3.71 \cdot 10^{-5}$	1.71	1030

TABLE 9 (cont.)

Pasquill Stability Class	a[*]	b[*]
A (very unstable)	0.40	0.85
B (unstable)	0.40	0.87
C (slightly unstable)	0.23	0.89
D (neutral)	0.14	0.89
E (slightly stable)	0.11	0.89
F (stable)	0.072	0.89

[*] Determined from dispersion curves given by Turner (1970).

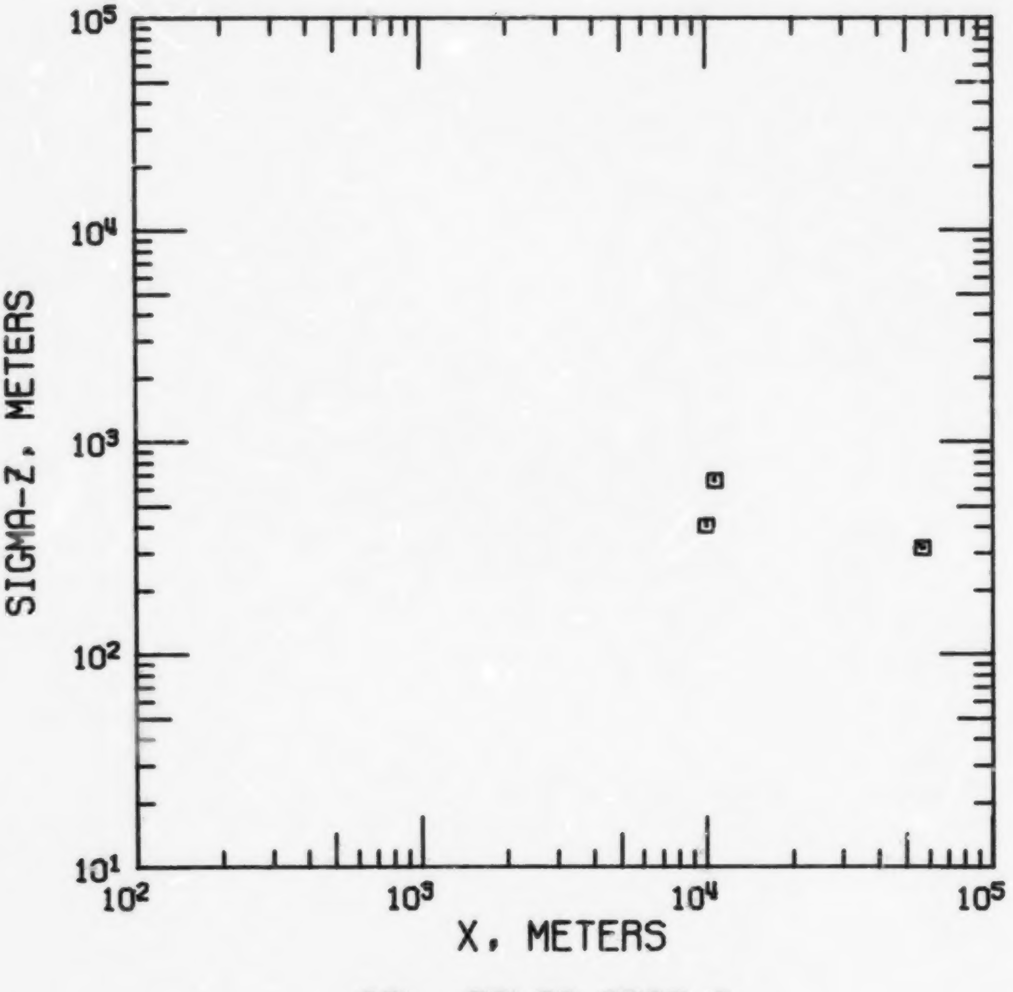
Figure 168.



CAL. DELTA TEST 1

Dow Auto Traverse

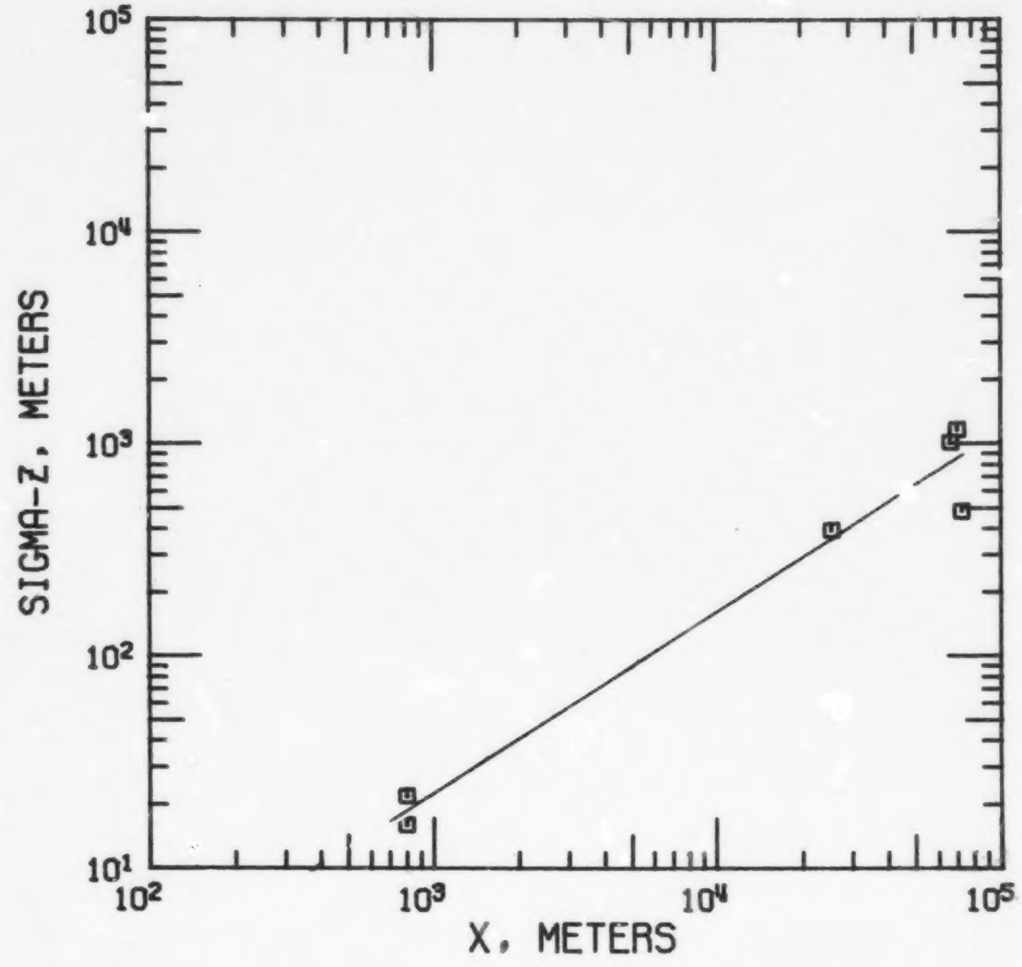
Figure 169.



CAL. DELTA TEST 2

Dow Auto Traverse

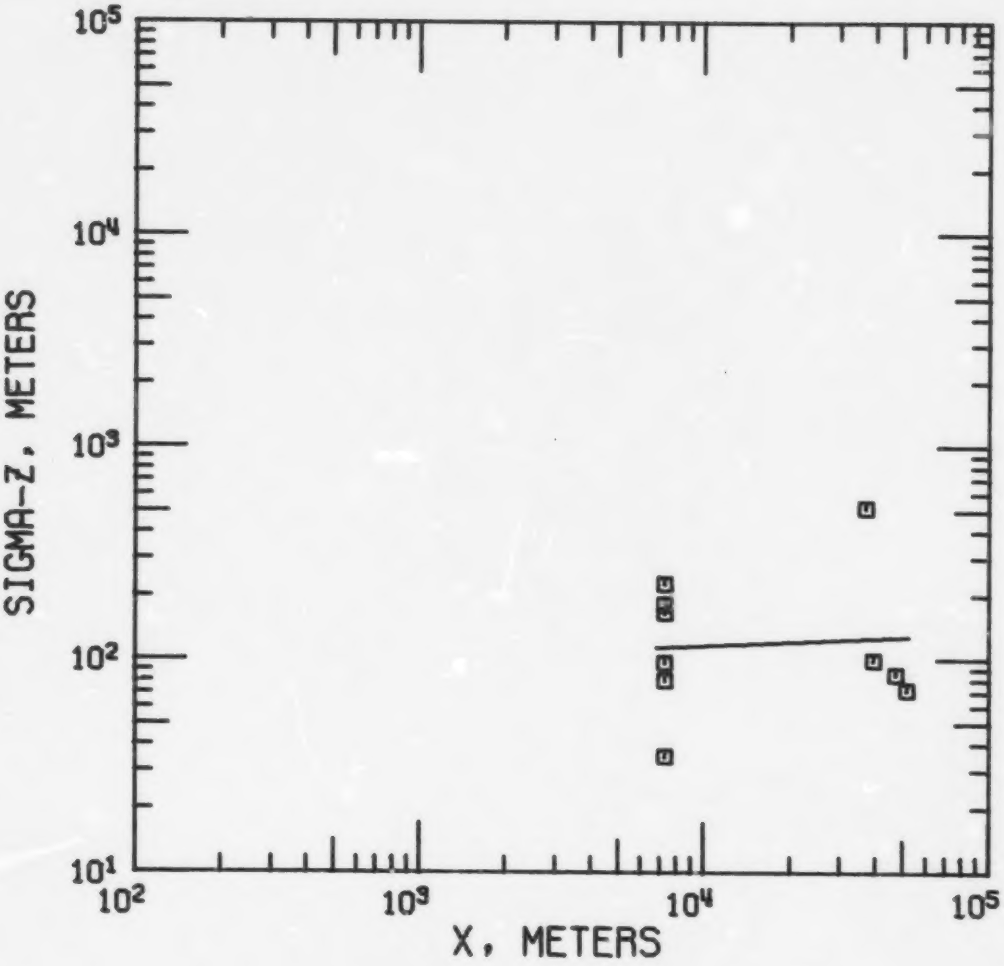
Figure 170.



CAL. DELTA TEST 2

Martinez Auto Traverse

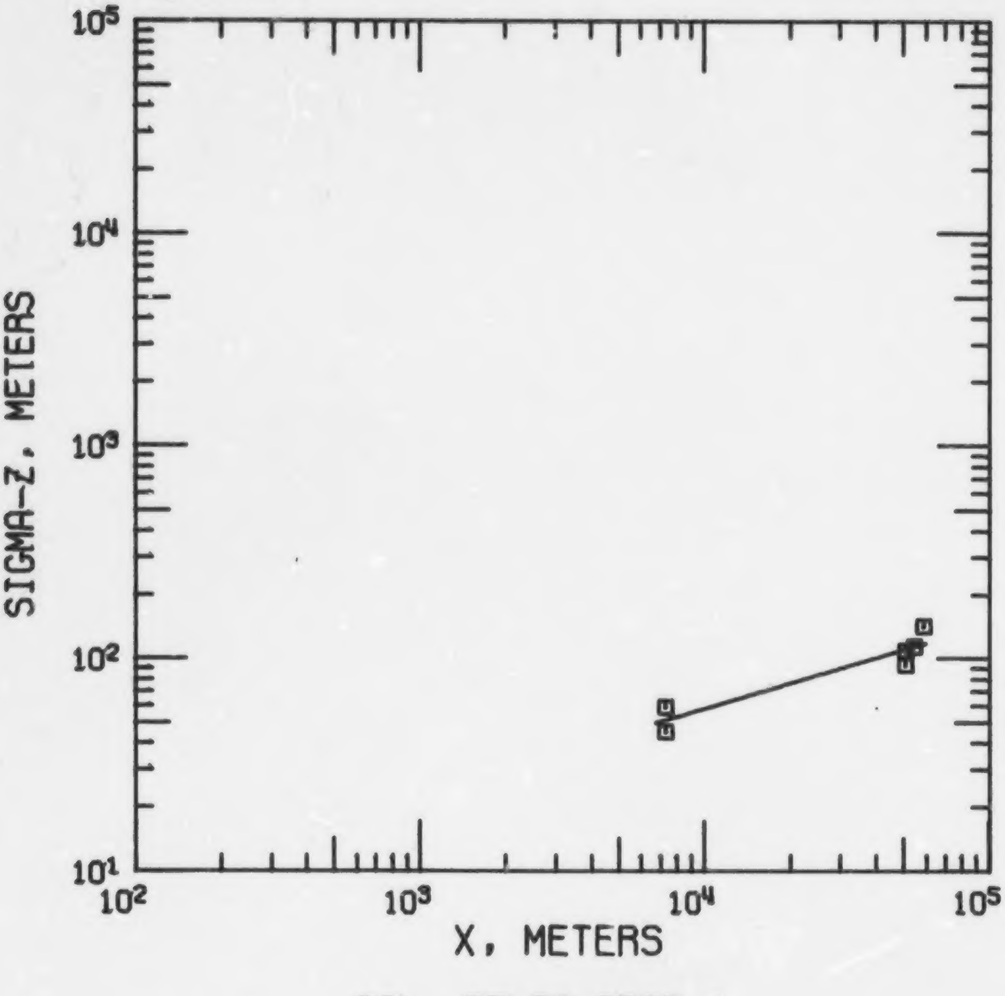
Figure 171.



CAL. DELTA TEST 3

Dow Auto Traverse

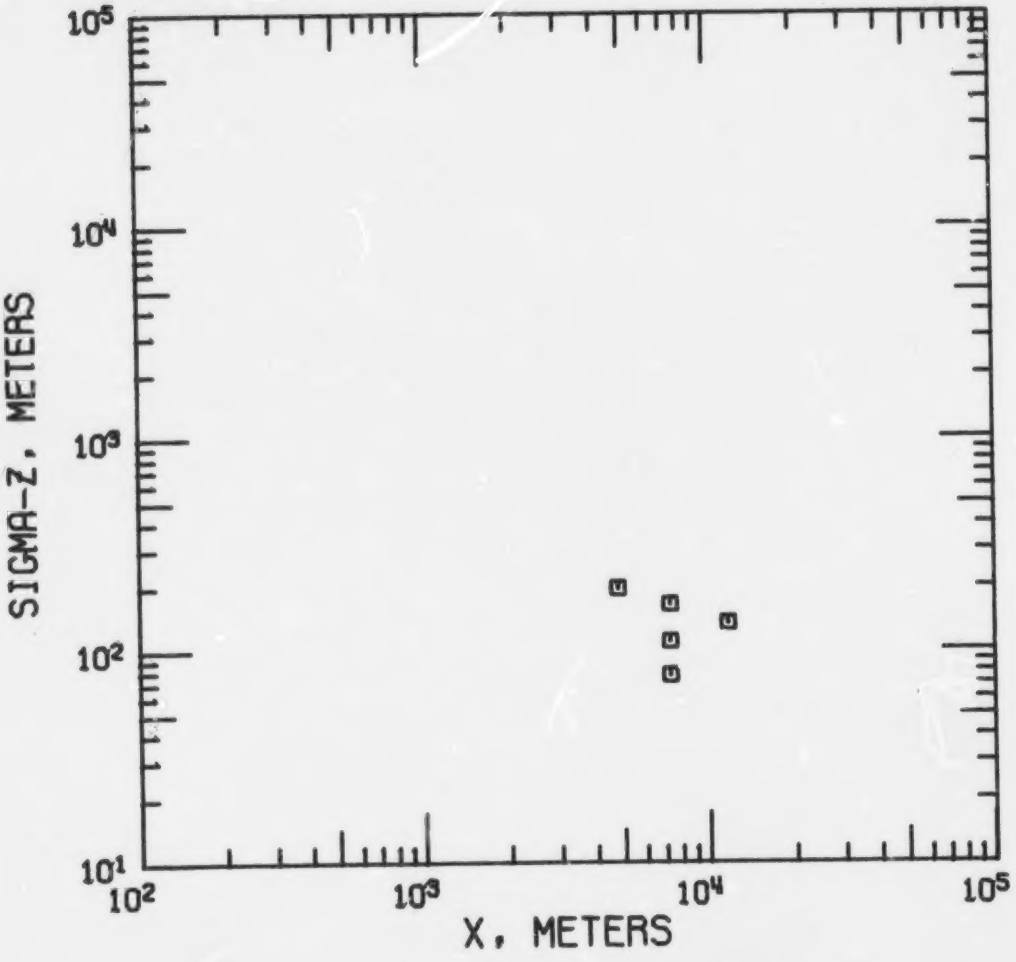
Figure 172.



CAL. DELTA TEST 4

Dow Auto Traverse

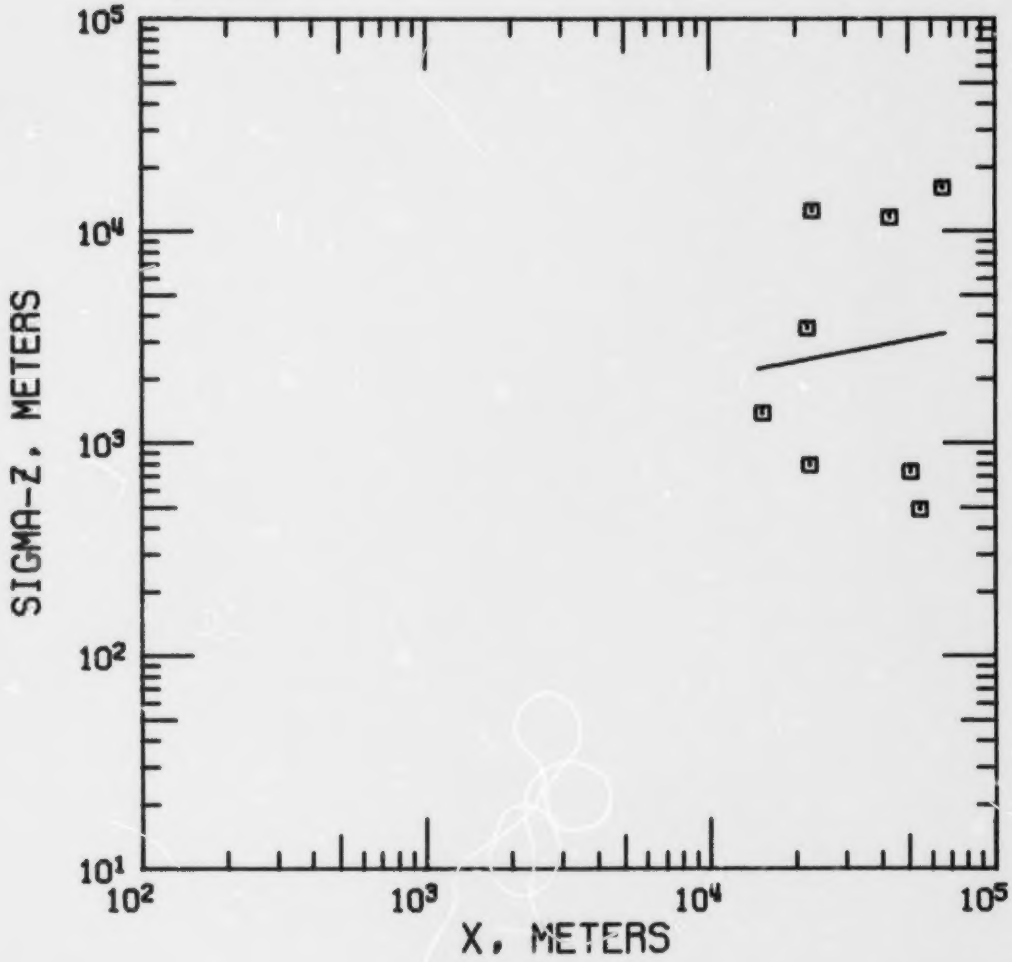
Figure 173.



CAL. DELTA TEST 6

Dow Auto Traverse

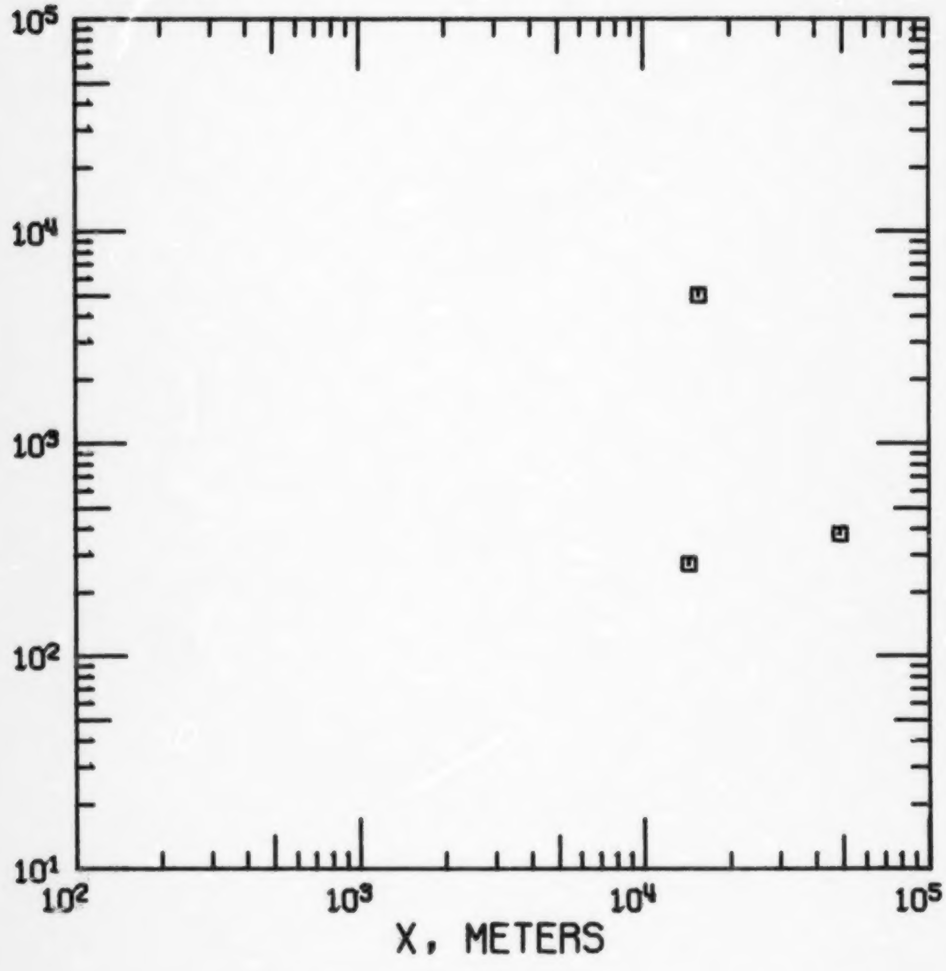
Figure 174.



CAL. DELTA TEST 7

Pinole Auto Traverse

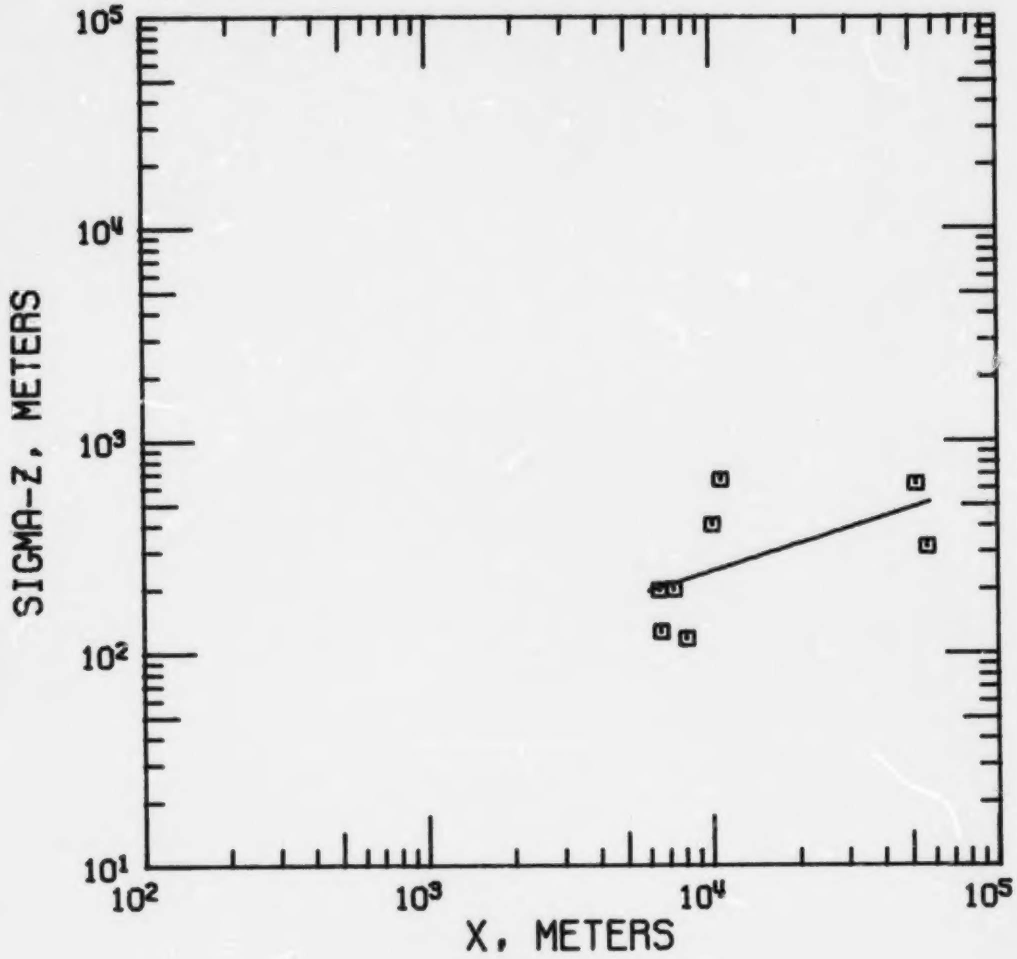
Figure 175.



CAL. DELTA TEST 8

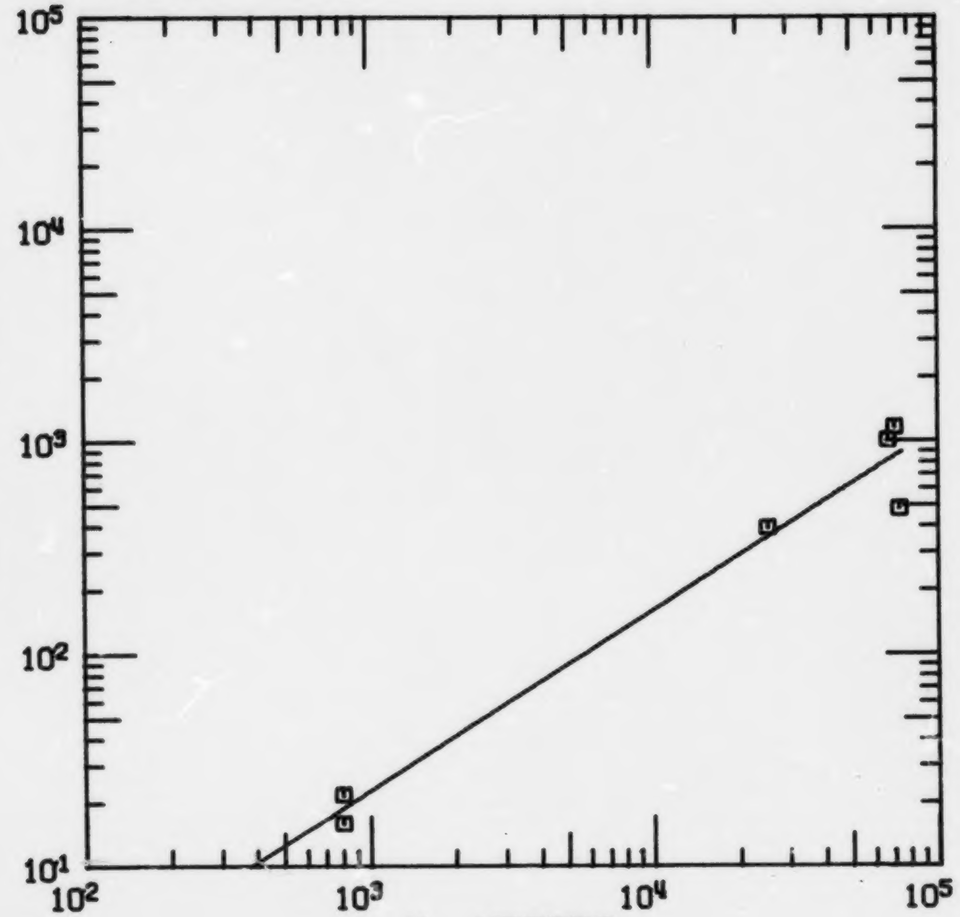
Pinole Auto Traverse

Figure 176.



SEA BREEZE
DOW AUTO TRAV.

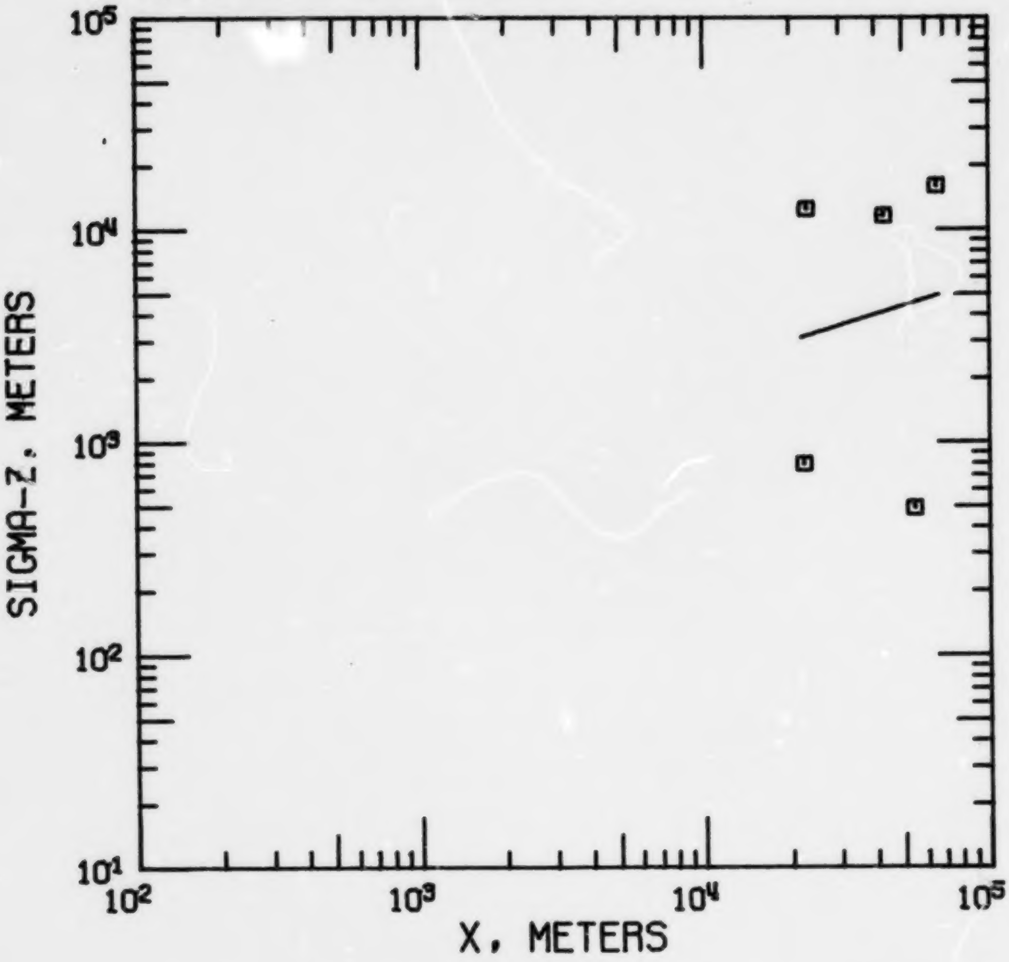
Figure 177.



SEA BREEZE

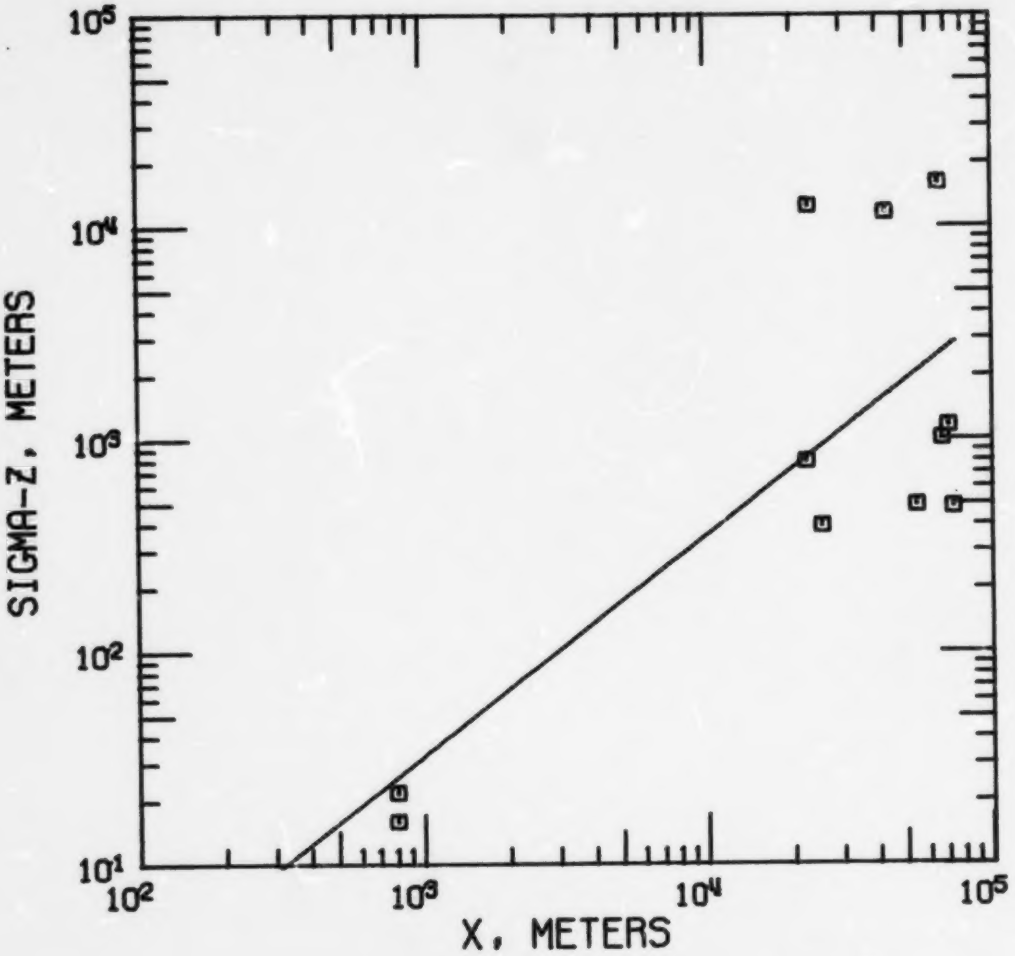
MARTINEZ AUTO TRAV.

Figure 178.



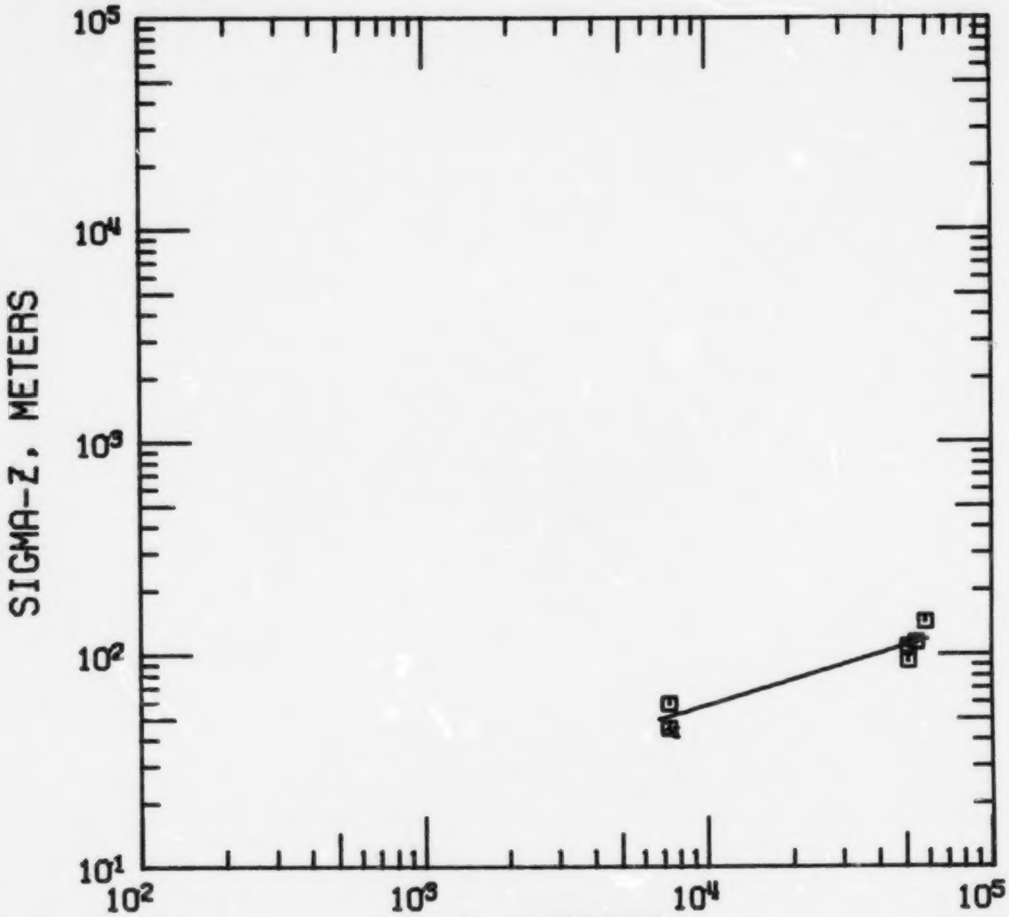
SEA BREEZE
PINOLE AUTO TRAV.

Figure 179.



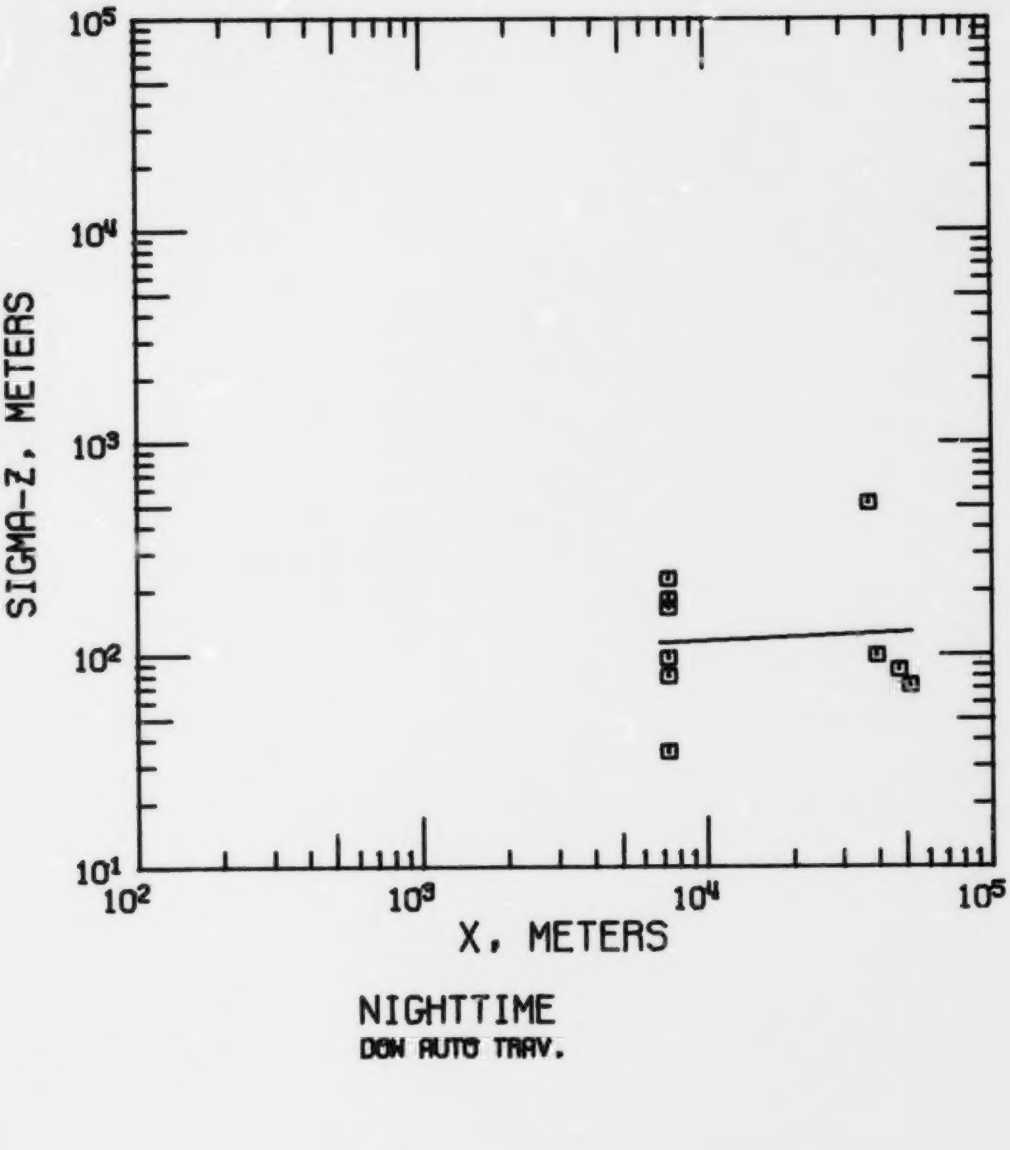
SEA BREEZE
PINOLE-MART AUTO TRAV.

Figure 180.



SEA BREEZE TAIL
DOW AUTO TRAV.

Figure 181.



NIGHTTIME
DOW AUTO TRAV.

TABLE 10

VERTICAL CROSSWIND DISPERSION COEFFICIENTS

$$\sigma_z = c\, X^d$$

Test, Release Point	c m^{1-b}	d	σ (std. dev. about best-fit line)* (m)
Test 1, Dow	$3.37 \cdot 10^{-1}$	0.681	45
Test 2, Dow	-	-	-
Test 2, Martinez	$6.61 \cdot 10^{-2}$	0.847	246
Test 3, Dow	$6.83 \cdot 10^{1}$	0.0582	146
Test 4, Dow	1.46	0.400	14
Test 5, Dow	-	-	-
Test 6, Dow	-	-	-
Test 7, Dow	-	-	-
Test 7, Pinole	$1.90 \cdot 10^{2}$	0.257	5228
Test 8, Pinole	-	-	-

$$* \ \sigma = \left[\frac{\sum_{i=1}^{n} (\sigma_{z_i} - \sigma_z)^2}{n-1} \right]^{\frac{1}{2}}$$ where σ_{z_i} are the data points and $\sigma_z = cX^d$

- -

Meteorological Period, Release Point	c	d	σ (m) (std. dev. about best-fit line)
Pre-Sea Breeze, Dow	-	-	-
Pre-Sea Breeze, Pinole	-	-	-
Sea Breeze, Dow	4.93	0.424	194
Sea Breeze, Martinez	$6.61 \cdot 10^{-2}$	0.847	246
Sea Breeze, Pinole	$4.96 \cdot 10^{1}$	0.414	8529
Sea Breeze, Pinole & Martinez	$2.52 \cdot 10^{-2}$	1.04	6570
Sea Breeze Tail, Dow	1.46	0.400	14
Nighttime, Dow	$6.83 \cdot 10^{1}$	0.0582	146

TABLE 10 (cont.)

$^{*}\sigma_z = \exp[a_0 + a_1 \ln X + a_2 (\ln X)^2 + a_3 (\ln X)^3]$

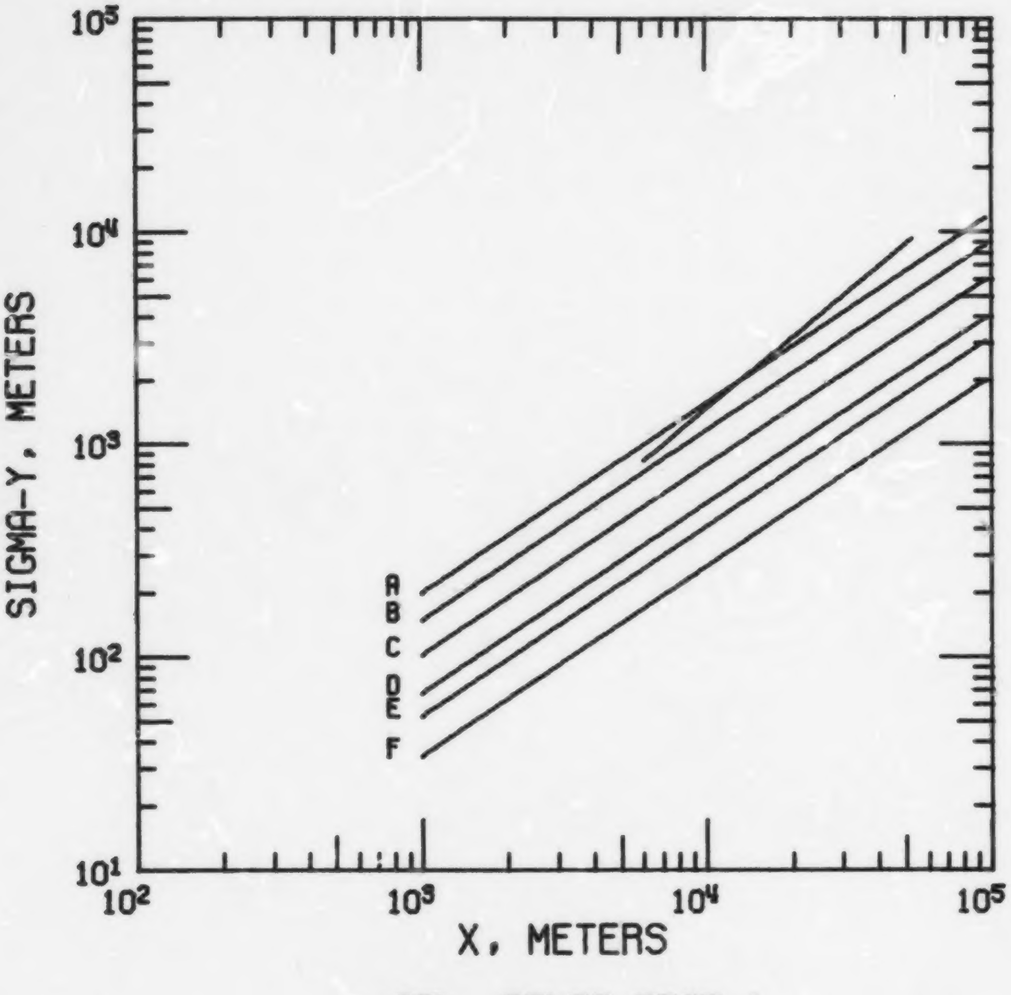
Turner-Pasquill Stability Class	a_0	a_1	a_2	a_3
A (very unstable)	6.10	2.11	0	0
B (unstable)	4.70	1.09	$9.12 \cdot 10^{-3}$	$-2.14 \cdot 10^{-3}$
C (slightly unstable)	4.10	0.940	$-7.56 \cdot 10^{-3}$	$2.86 \cdot 10^{-4}$
D (neutral)	3.46	0.662	$-1.28 \cdot 10^{-2}$	$-1.12 \cdot 10^{-3}$
E (slightly stable)	3.12	0.592	$-9.61 \cdot 10^{-3}$	$-4.24 \cdot 10^{-3}$
F (stable)	2.63	0.651	$-6.08 \cdot 10^{-2}$	$2.03 \cdot 10^{-3}$

[*] Best-fit expression for Pasquill dispersion curves, determined from Turner (1970).

3.12 Comparison of Experimental Dispersion Results with Pasquill Dispersion Parameters

The best-fit lines for σ_y versus X and σ_z versus X from the preceding section are plotted with the corresponding Pasquill σ_y and σ_z lines in the following figures. The values of the Pasquill σ_y dispersion coefficients for each stability class are given in Table 9. The coefficients of a best-fit curve corresponding to each Pasquill vertical dispersion curve are given in Table 10.

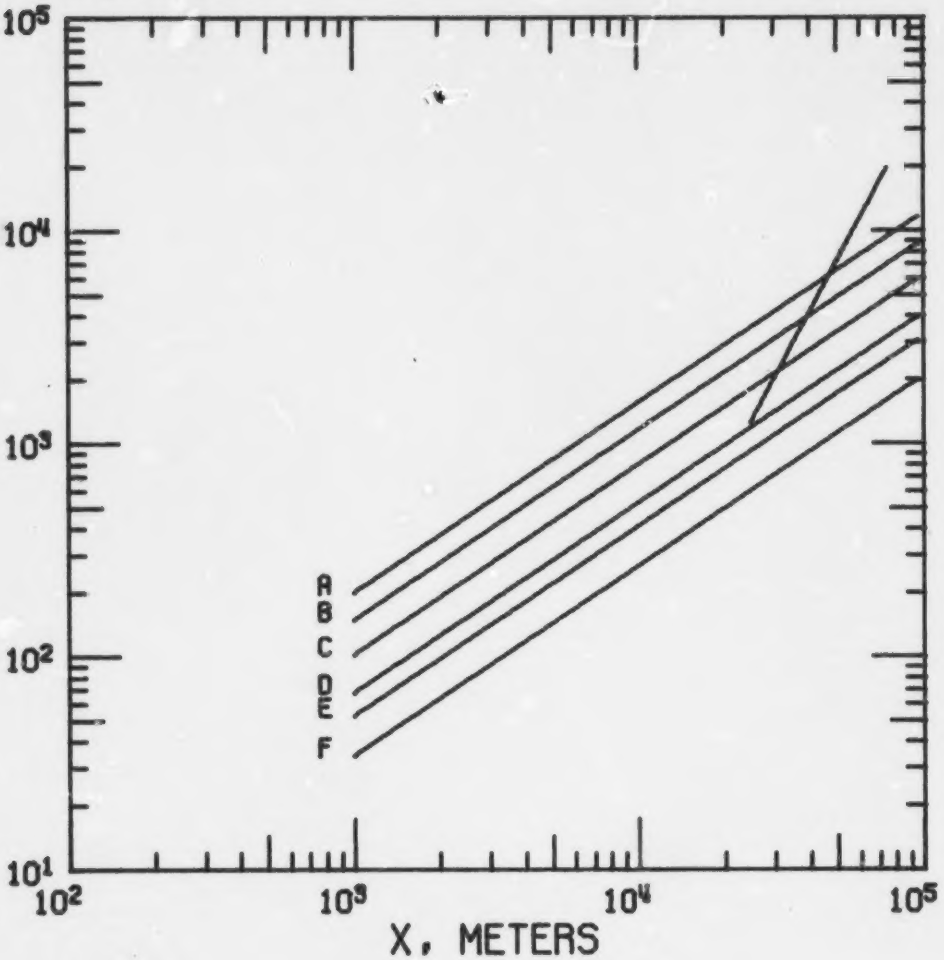
Figure 182.



CAL. DELTA TEST 1

DOW AUTO TRAV.

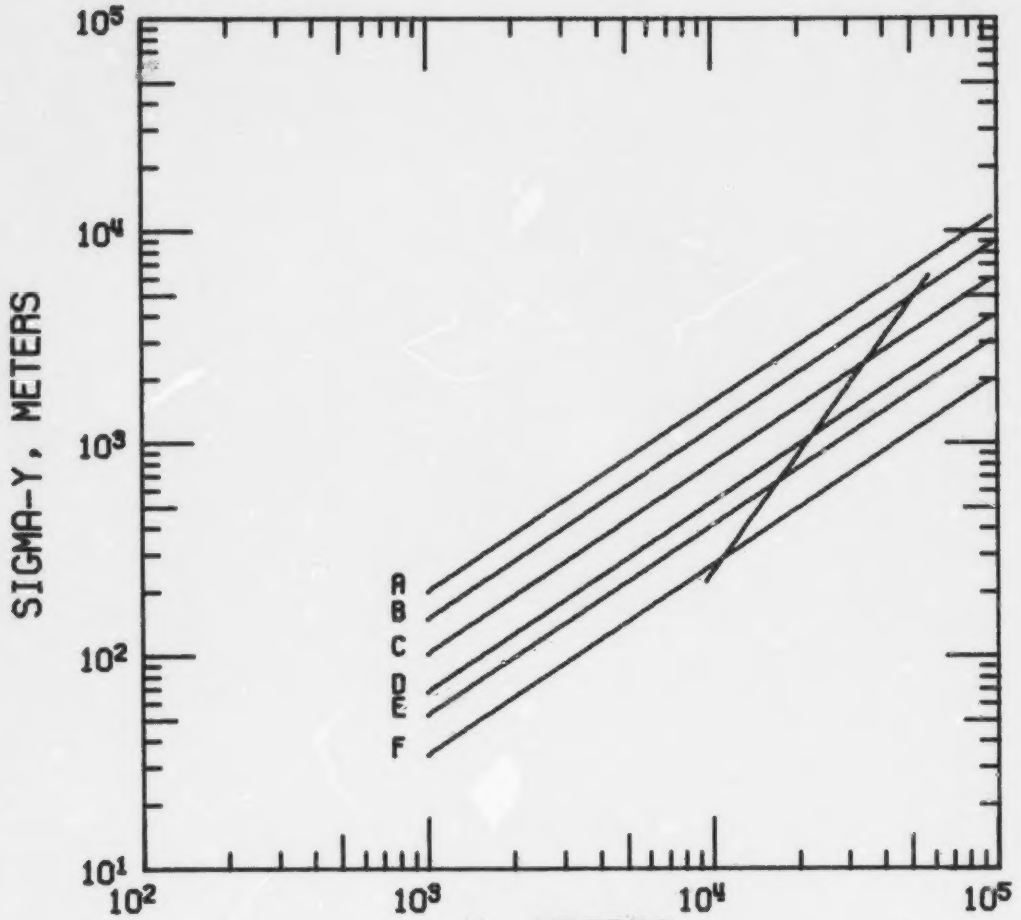
Figure 183.



CAL. DELTA TEST 2

MARTINEZ AUTO TRAV.

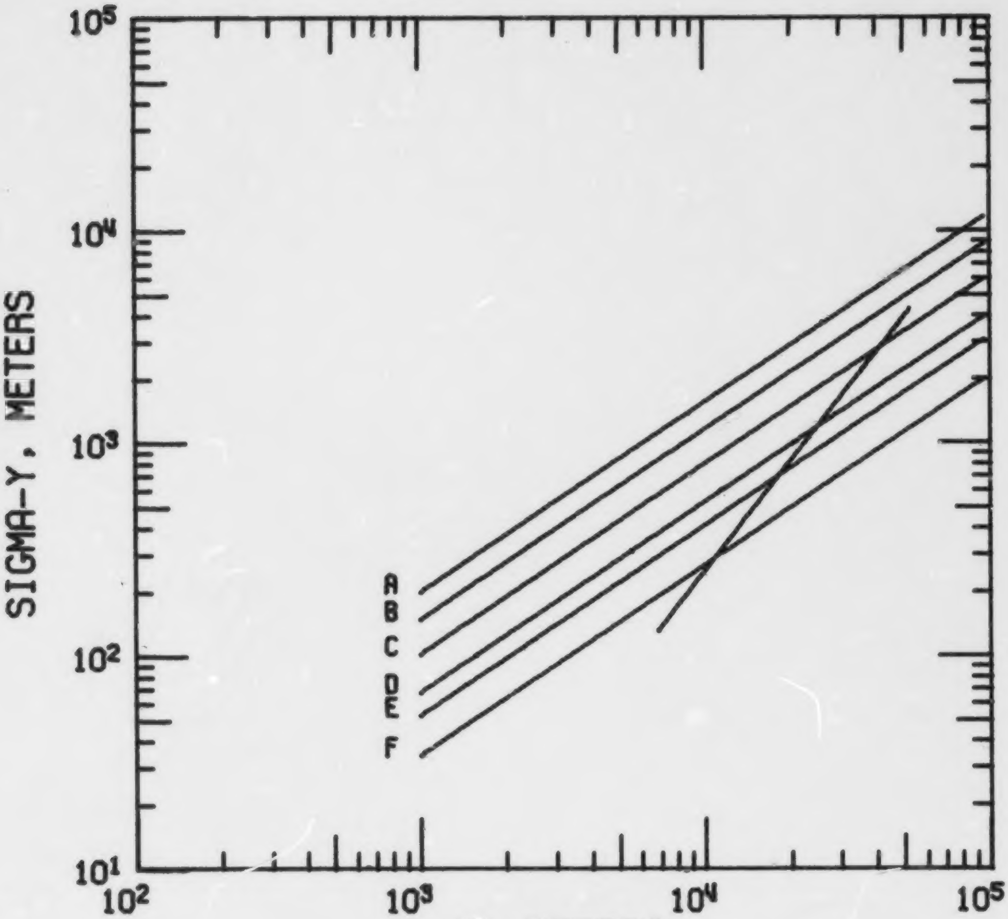
Figure 184.



CAL. DELTA TEST 2

DOW AUTO TRAV.

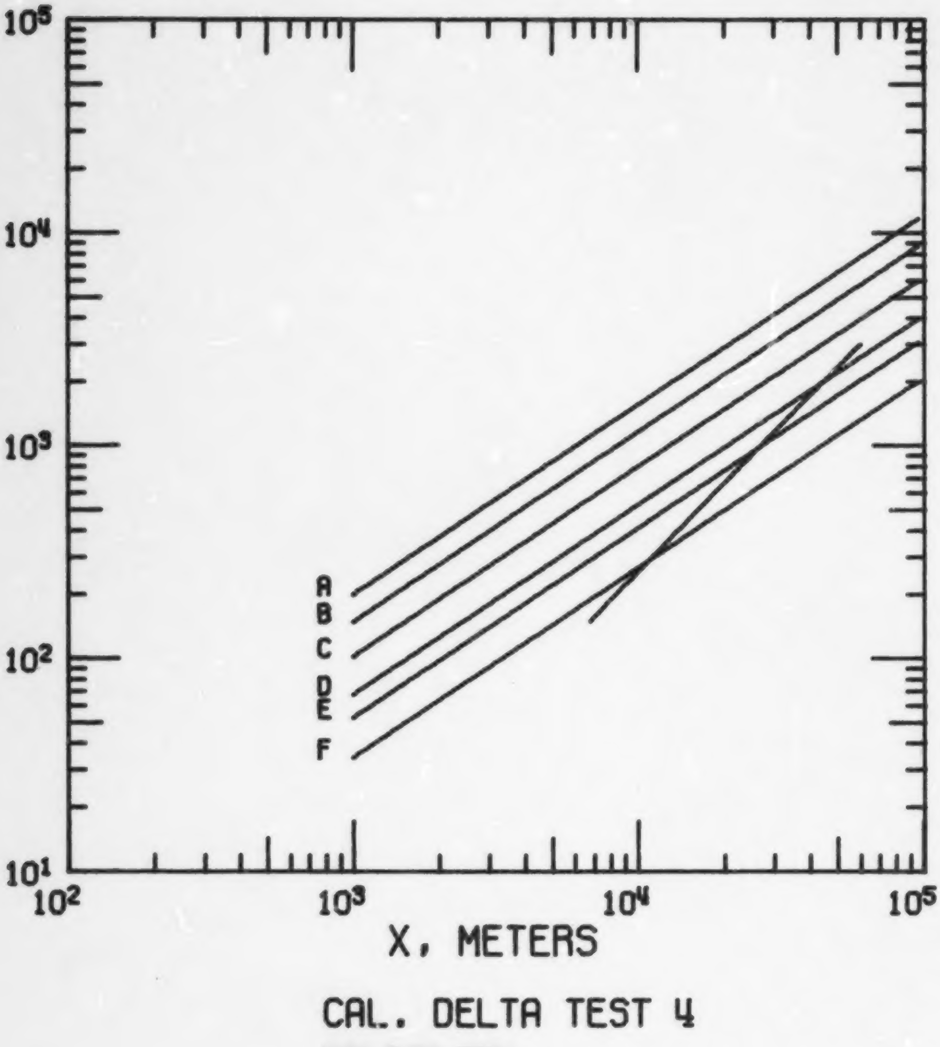
Figure 185.



CAL. DELTA TEST 3

DOW AUTO TRAV.

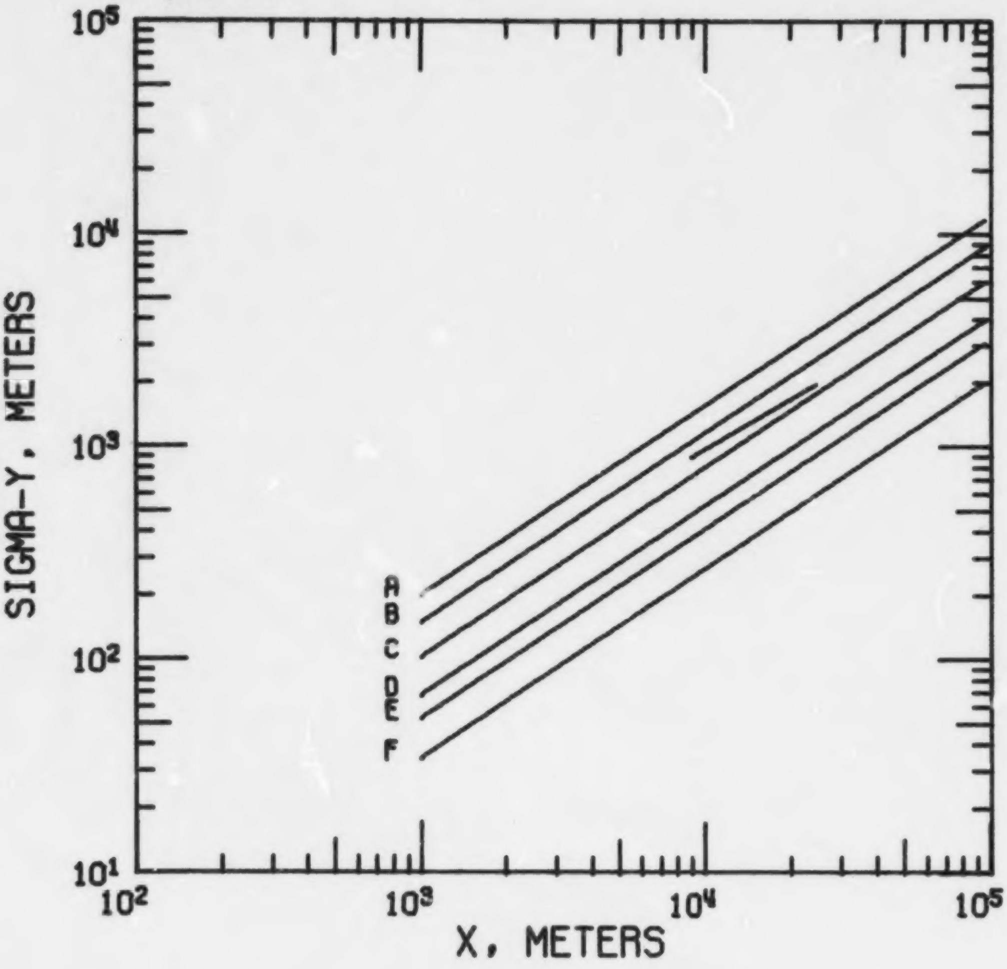
Figure 186.



CAL. DELTA TEST 4

DOW AUTO TRAV.

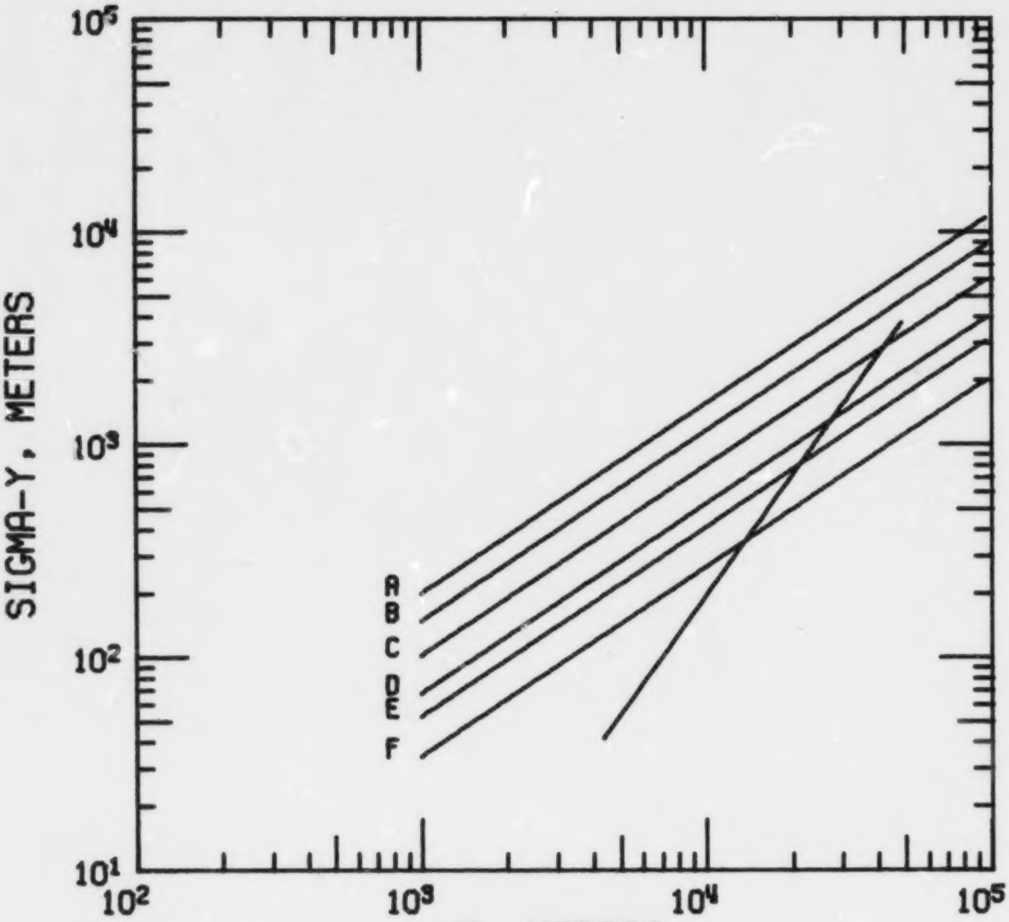
Figure 187.



CAL. DELTA TEST 5

DOW AUTO TRAV.

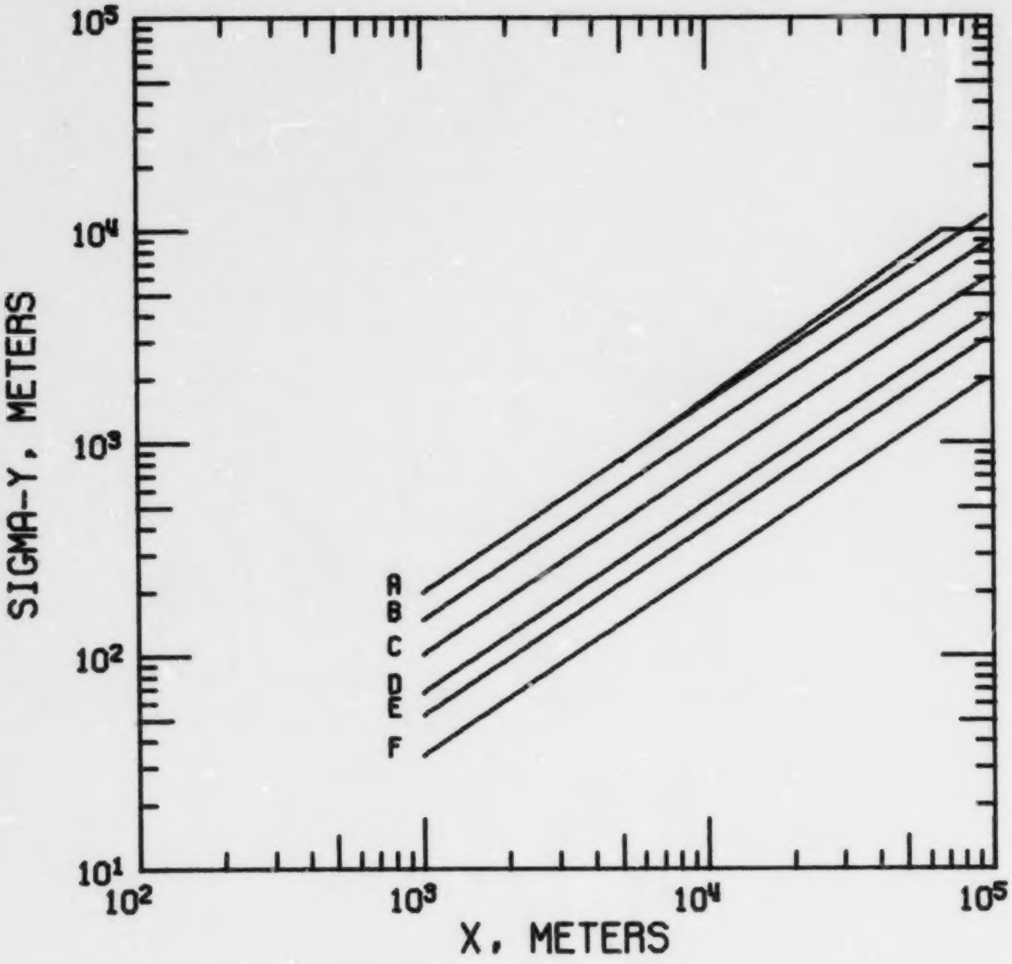
Figure 188.



CAL. DELTA TEST 6

DOW AUTO TRAV.

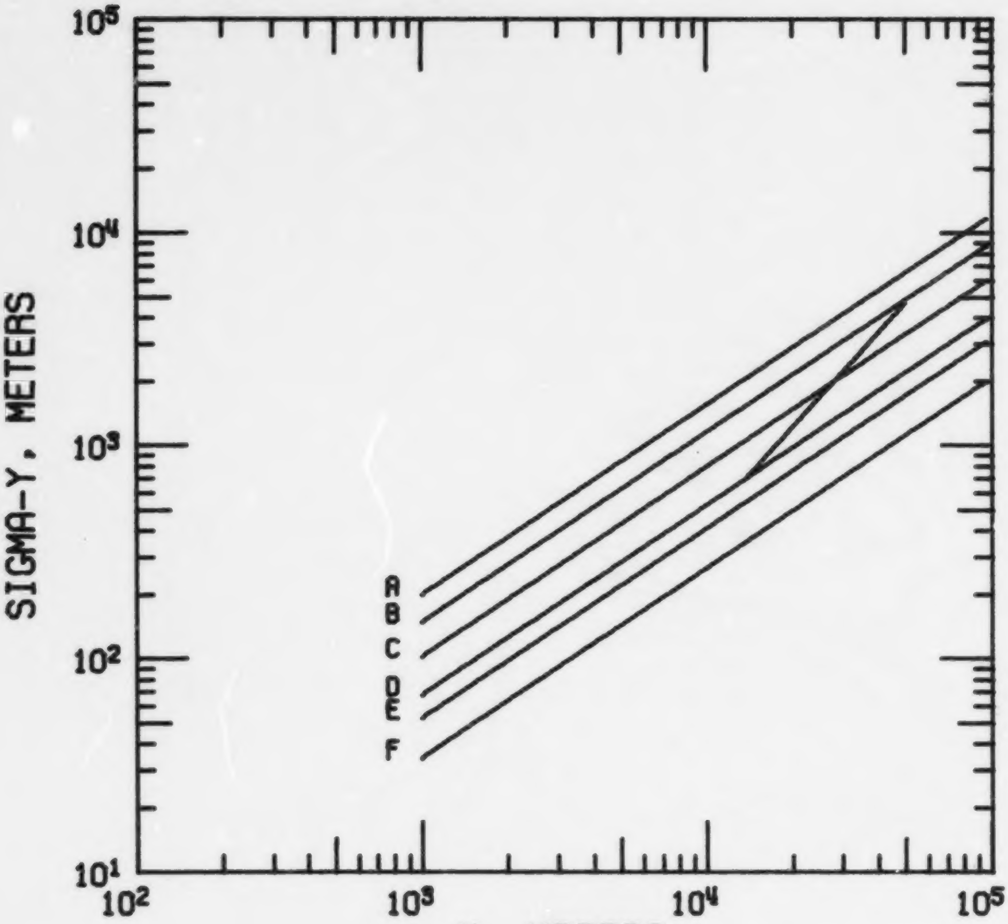
Figure 189.



CAL. DELTA TEST 7

PINOLE AUTO TRAV.

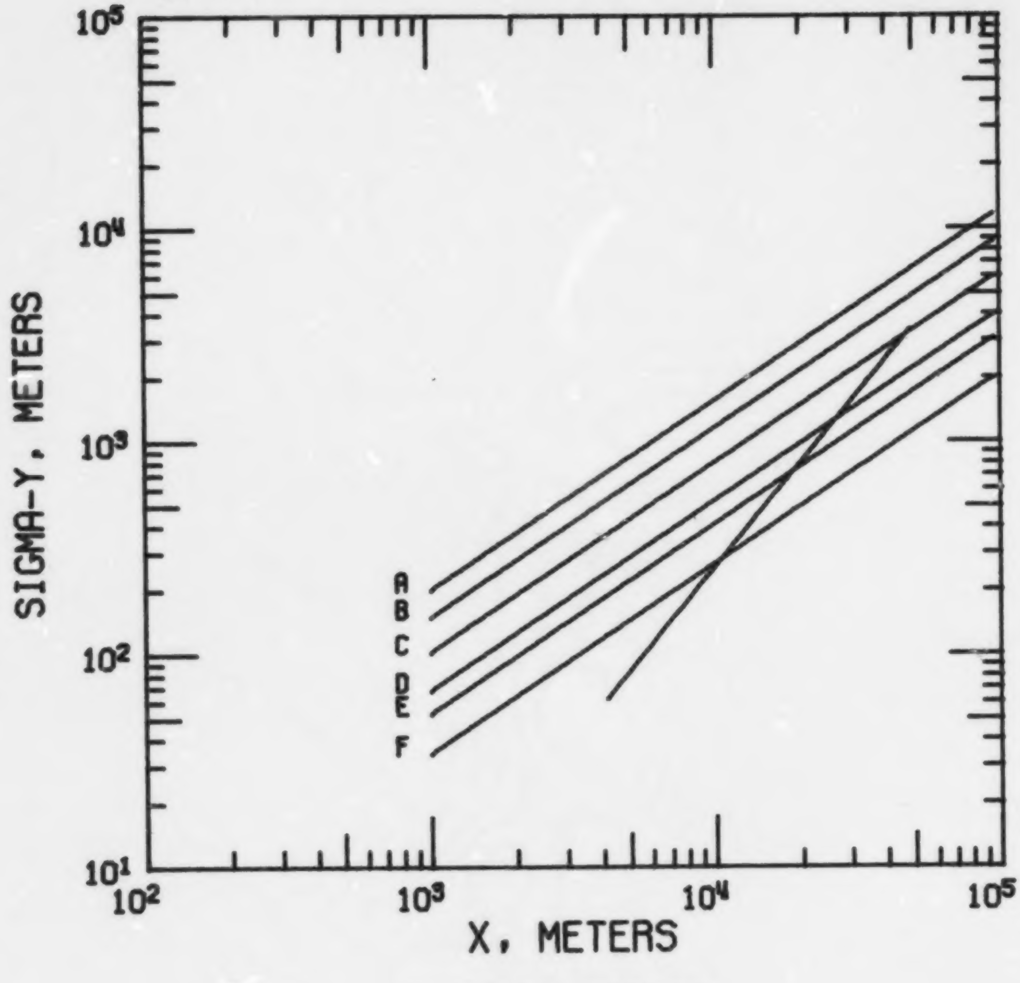
Figure 190.



CAL. DELTA TEST 8

PINOLE AUTO TRAV.

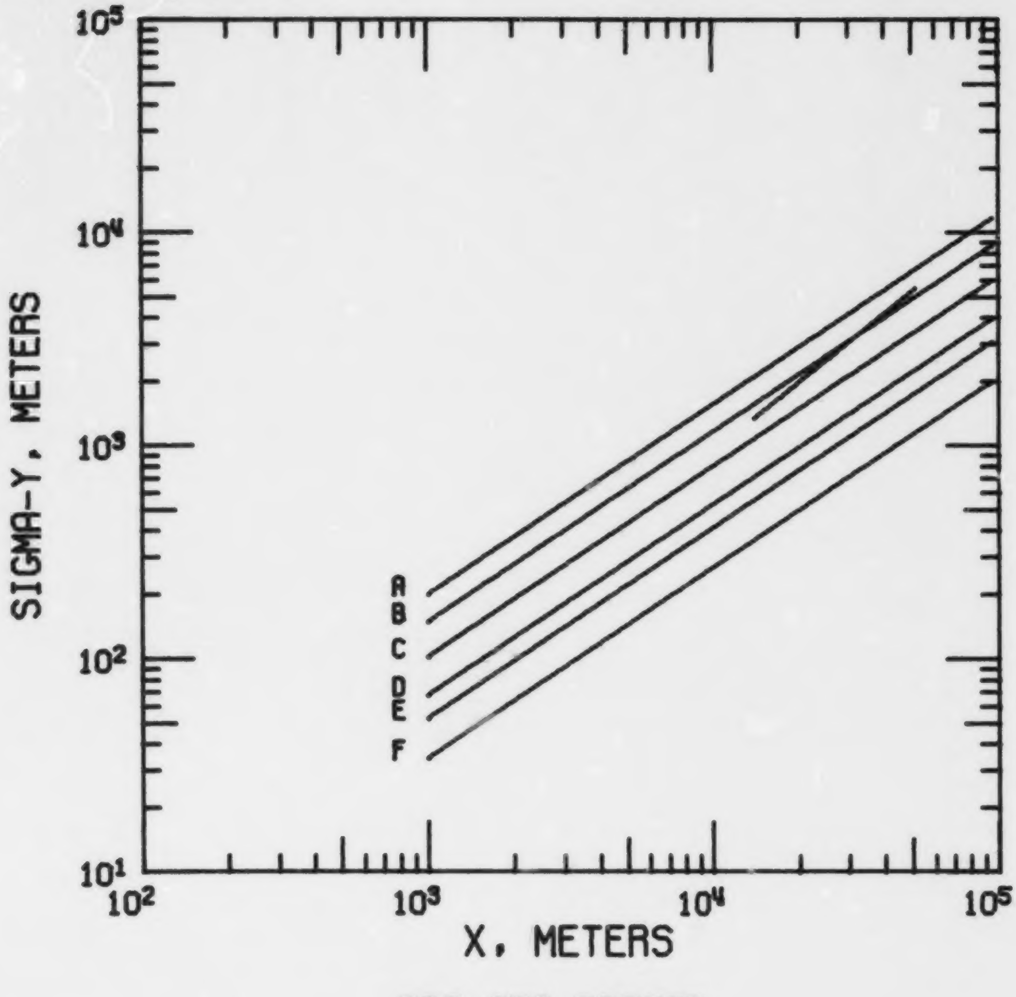
Figure 191.



PRE-SEA BREEZE

DOW AUTO TRAV.

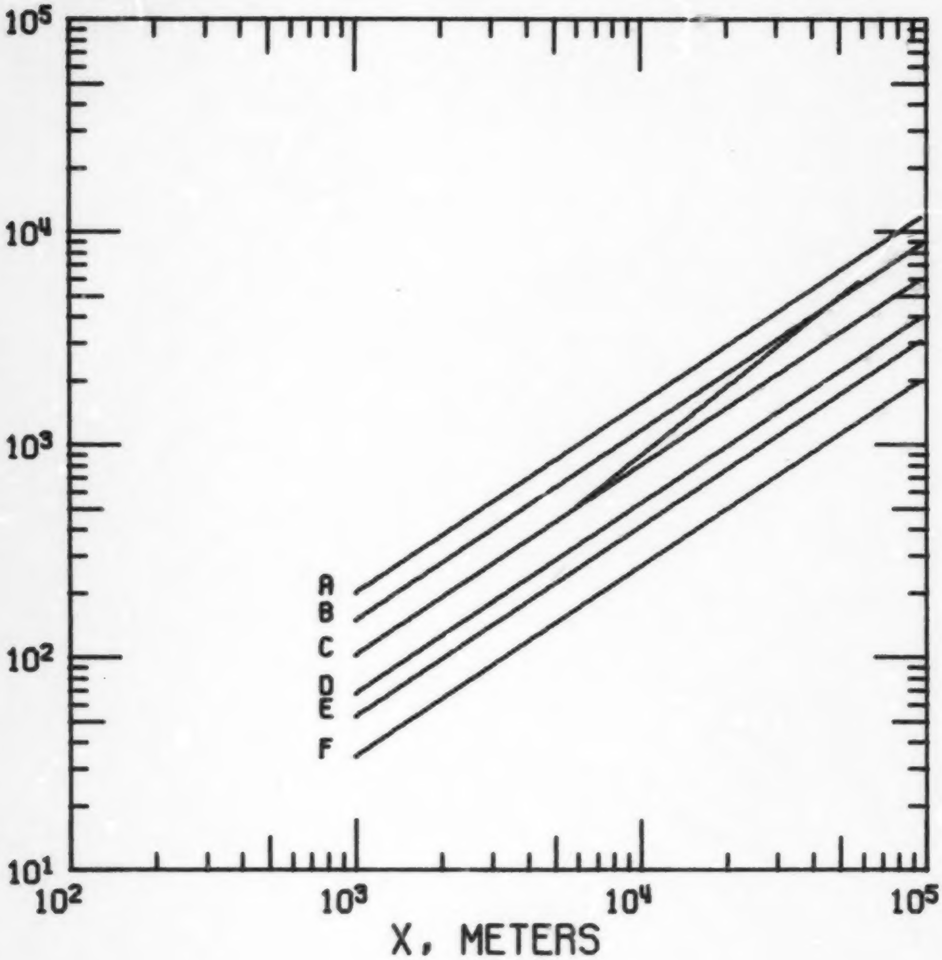
Figure 192.



PRE-SEA BREEZE

PINOLE AUTO TRAV.

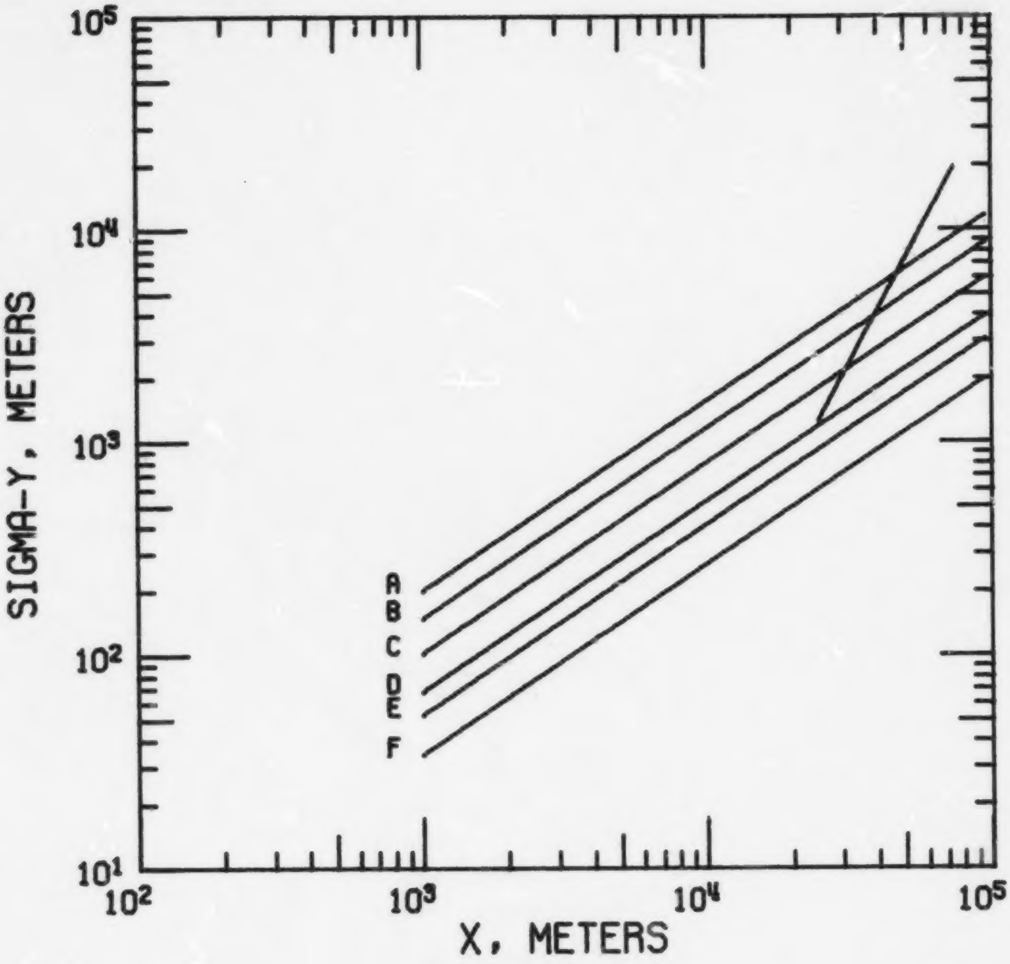
Figure 193.



SEA BREEZE

DOW AUTO TRAV.

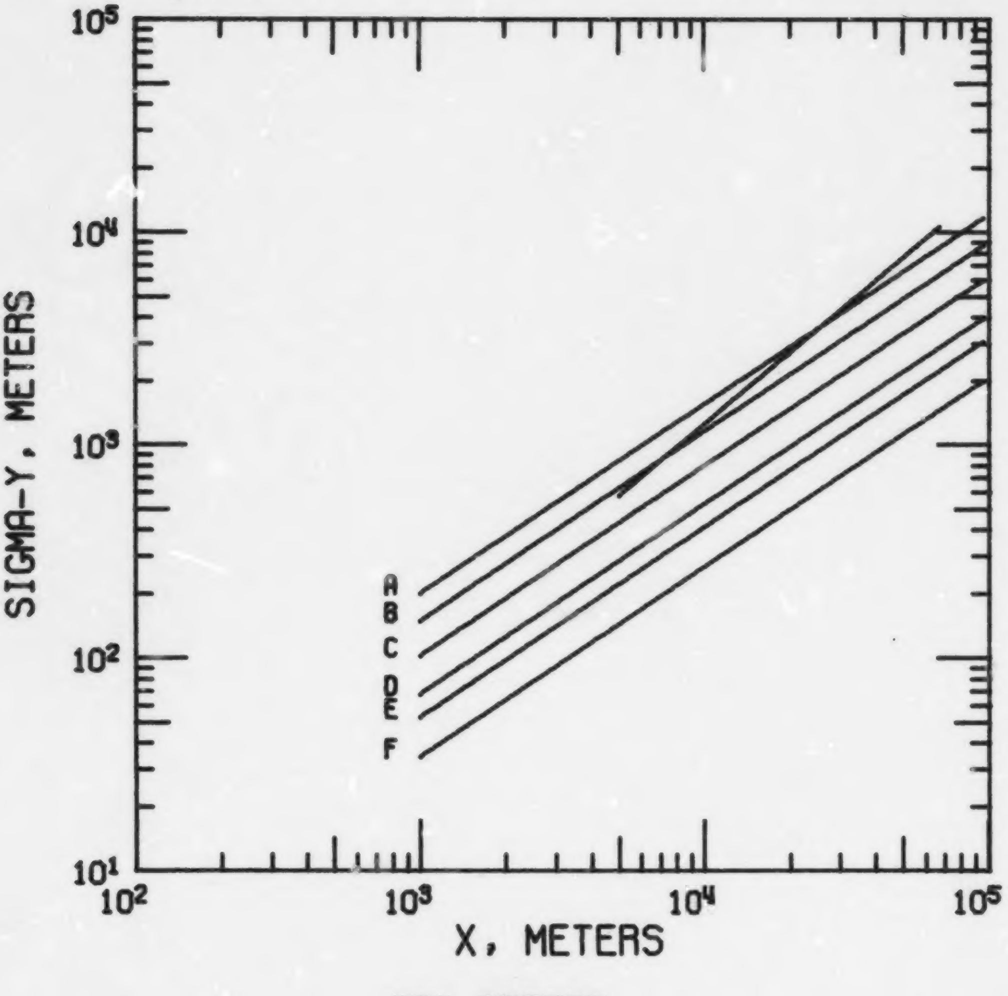
Figure 194.



SEA BREEZE

MARTINEZ AUTO TRAV.

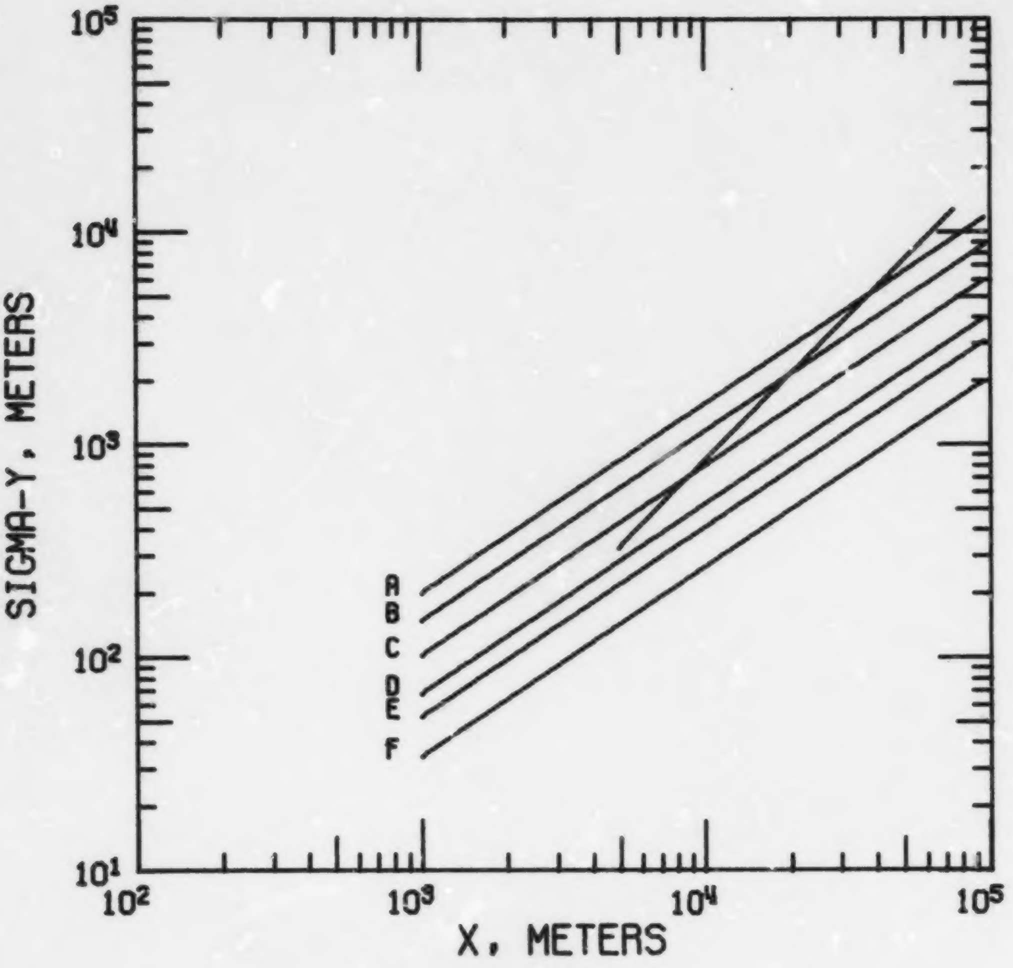
Figure 195.



SEA BREEZE

PINOLE AUTO TRAV.

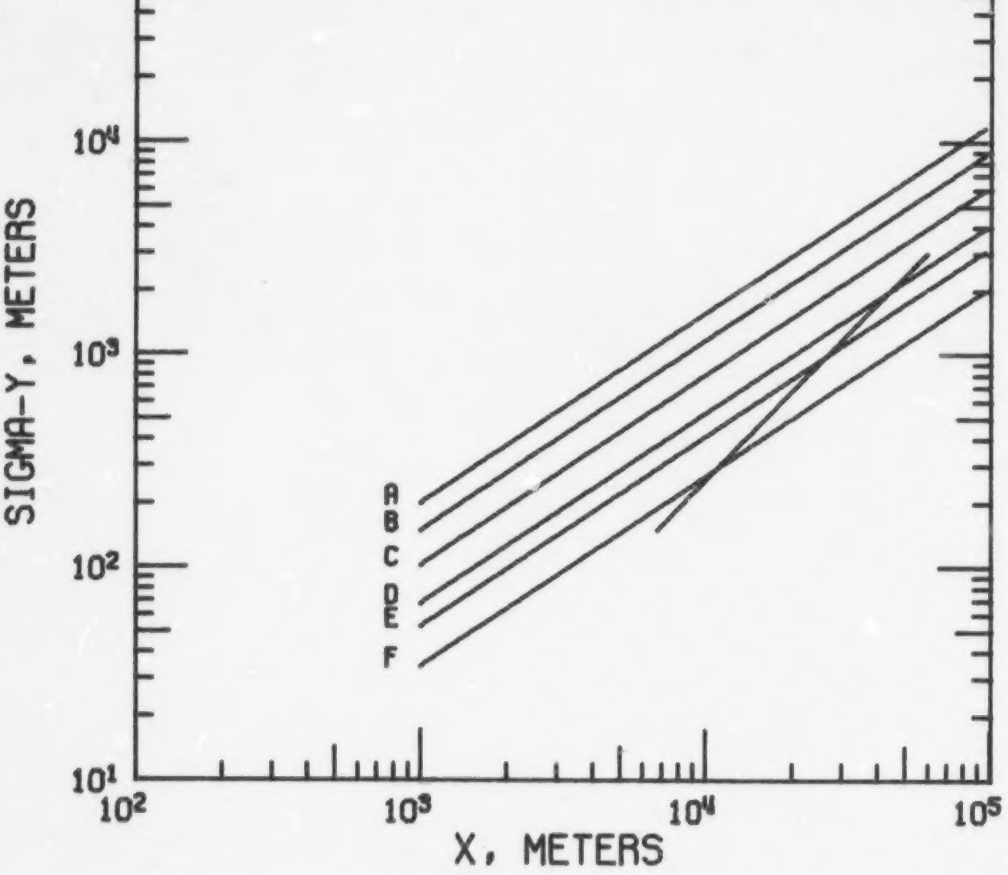
Figure 196.



SEA BREEZE

PINOLE-MART AUTO TRAV.

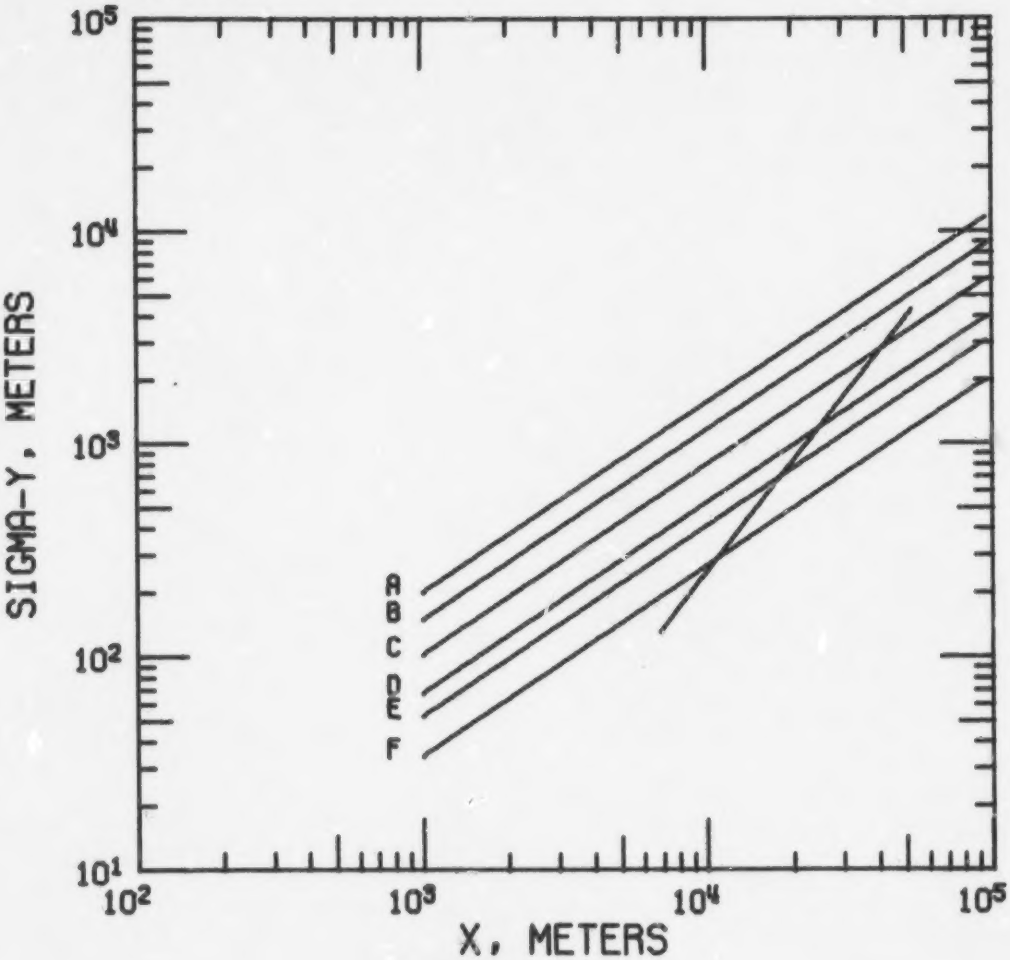
Figure 197.



SEA BREEZE TAIL

DOW AUTO TRAV.

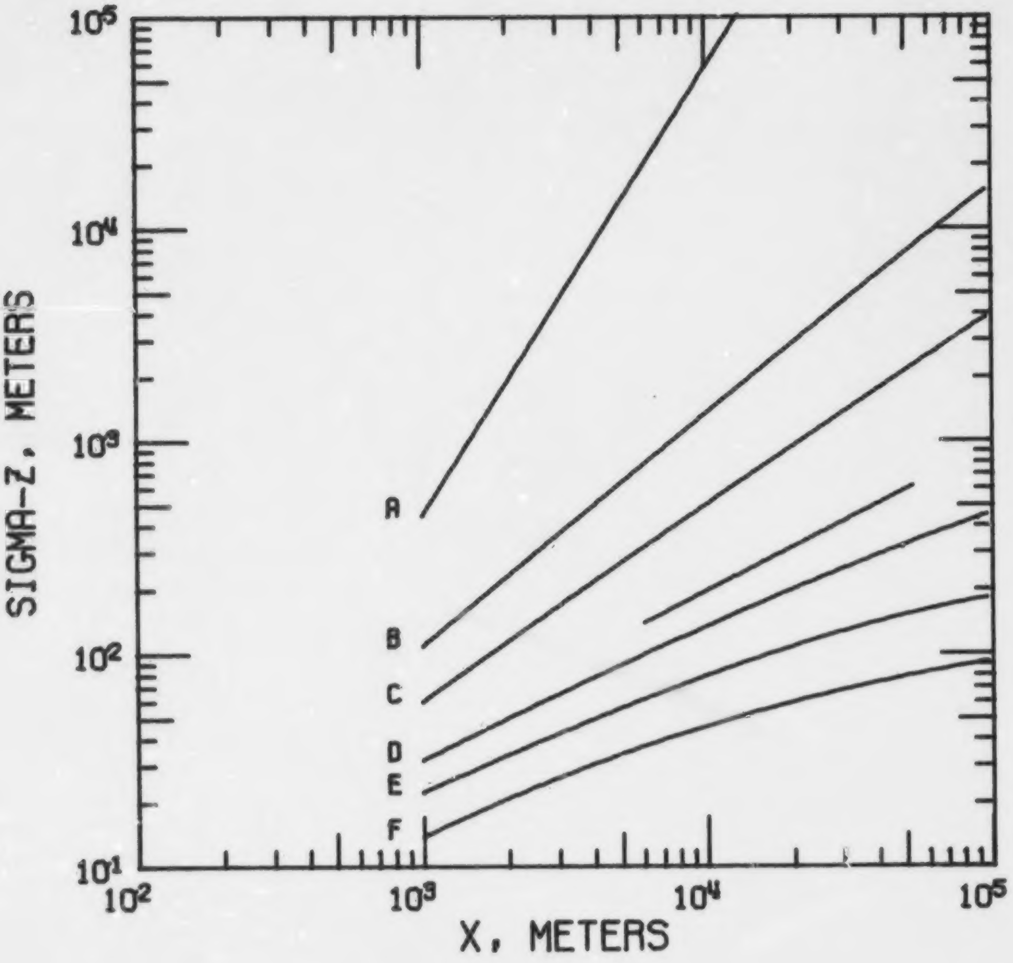
Figure 198.



NIGHTTIME

DOW AUTO TRAV.

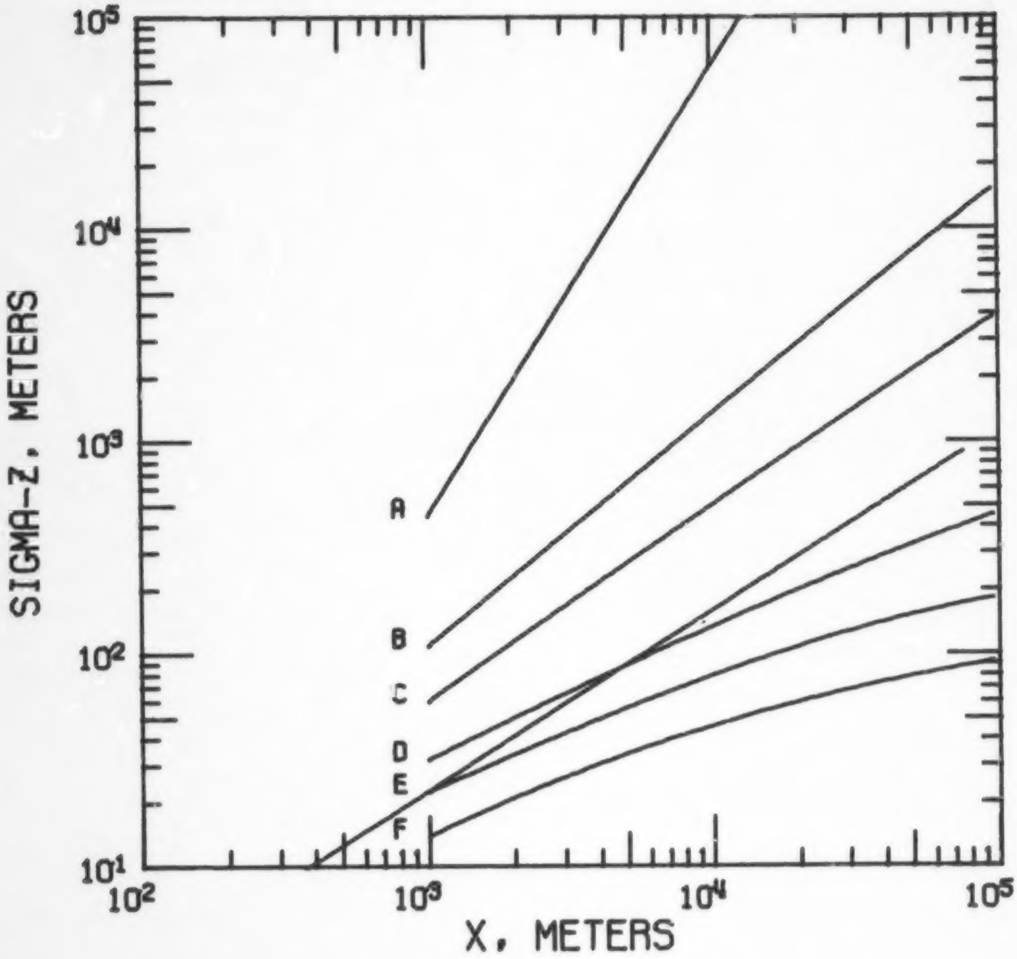
Figure 199.



CAL. DELTA TEST 1

DOW AUTO TRAV.

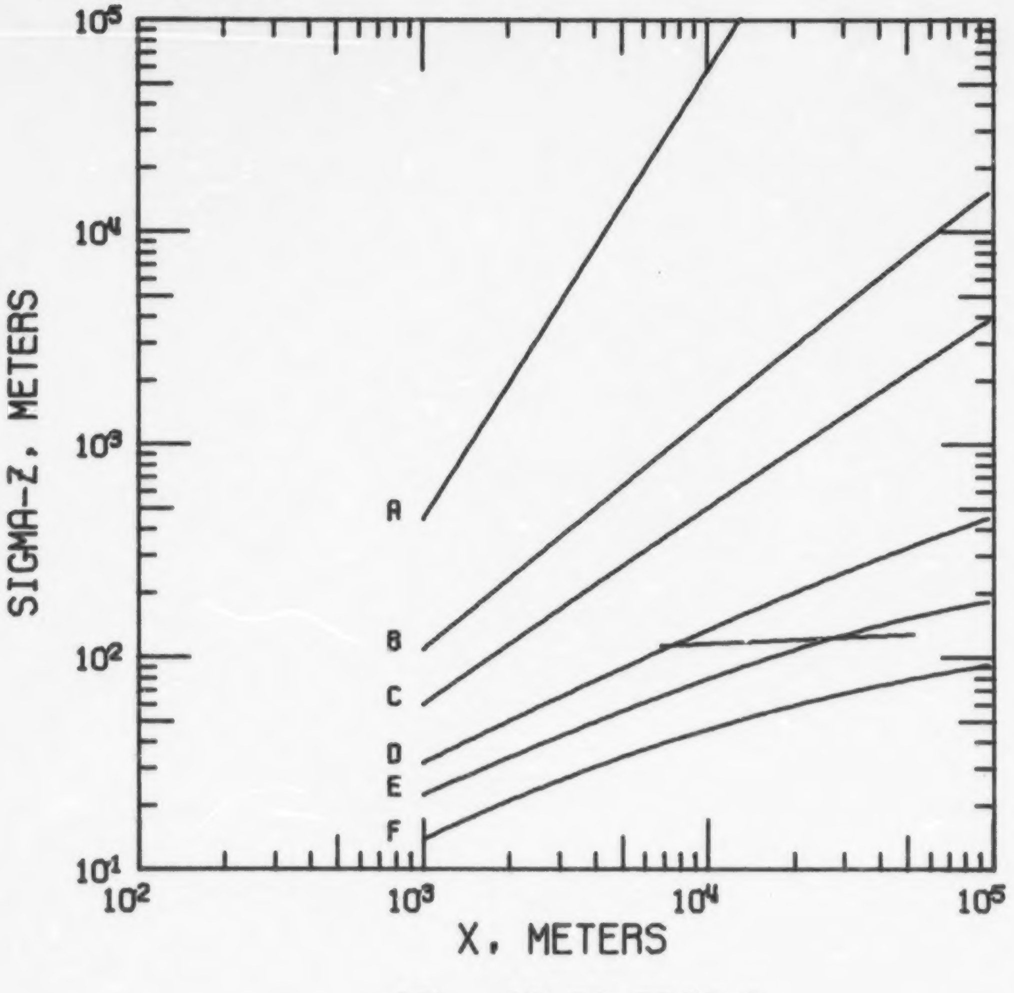
Figure 200.



CAL. DELTA TEST 2

MARTINEZ AUTO TRAV.

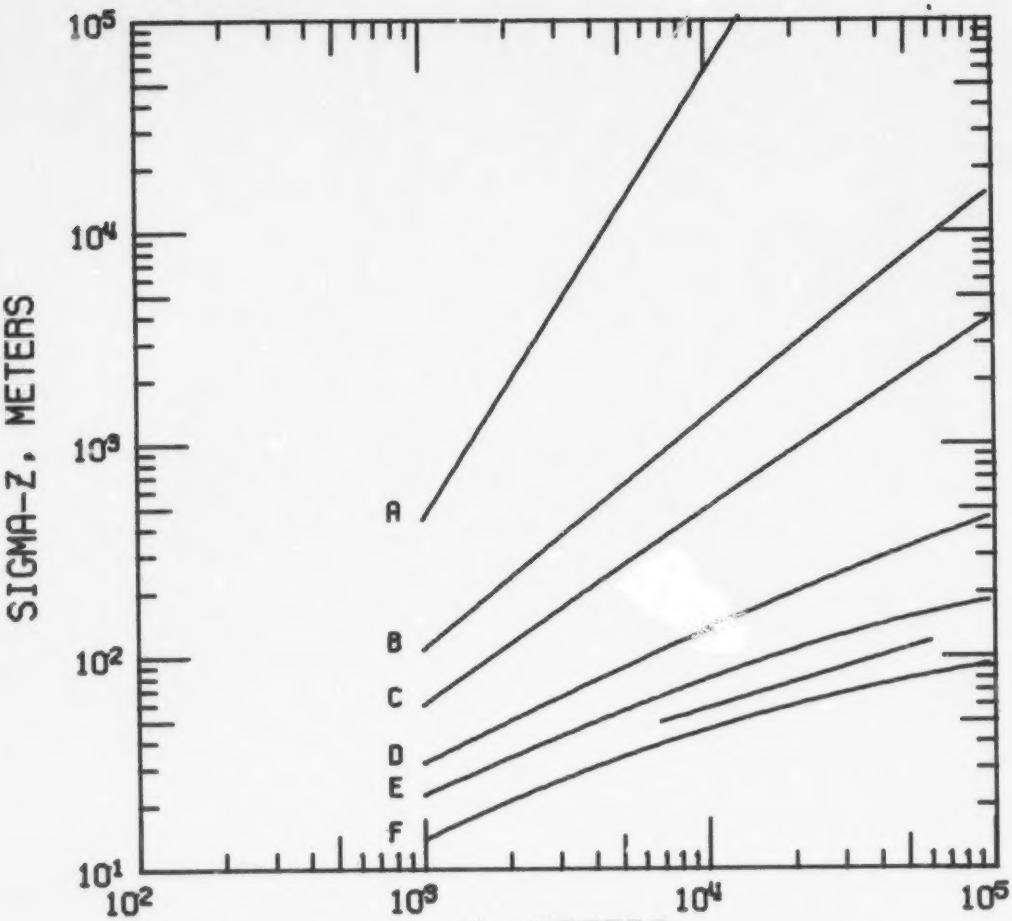
Figure 201.



CAL. DELTA TEST 3

DGW AUTO TRAV.

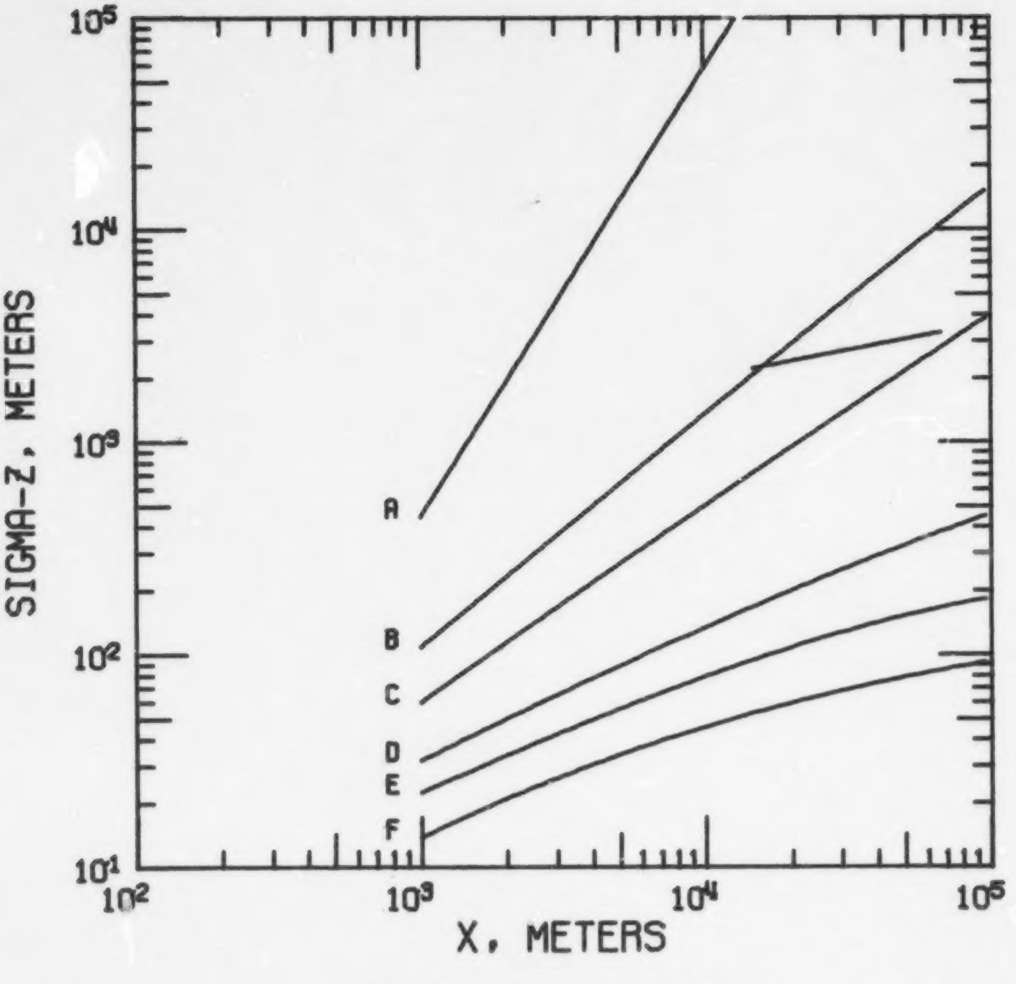
Figure 202.



CAL. DELTA TEST 4

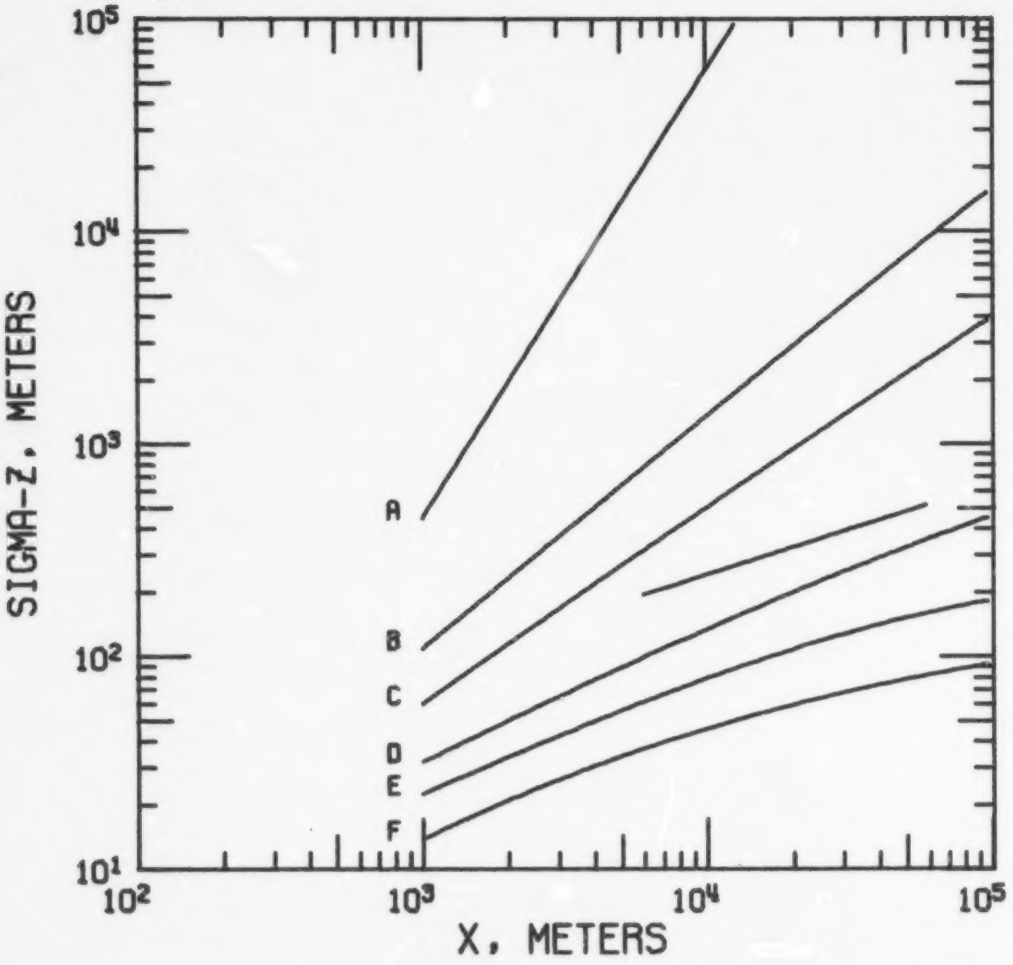
DOW AUTO TRAV.

Figure 203.



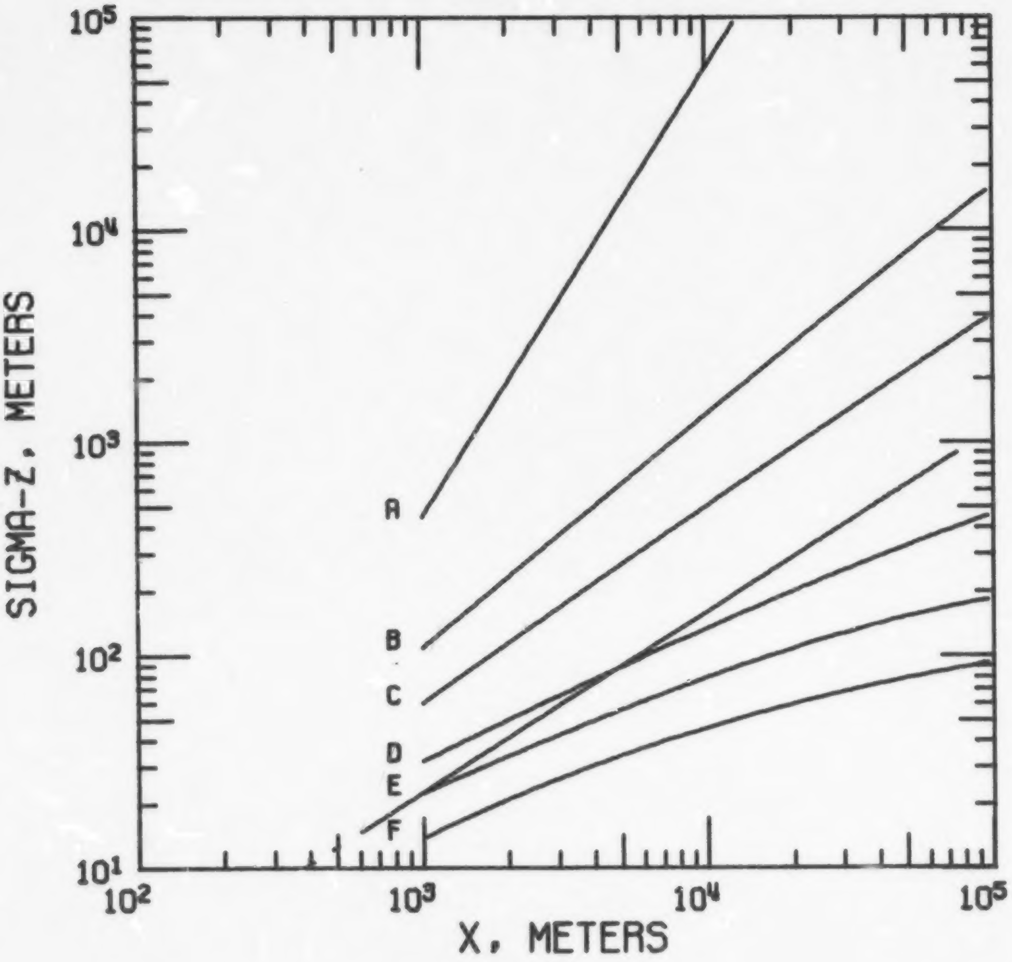
CAL. DELTA TEST 7
PINOLE AUTO TRAV.

Figure 204.



SEA BREEZE
DOW AUTO TRAV.

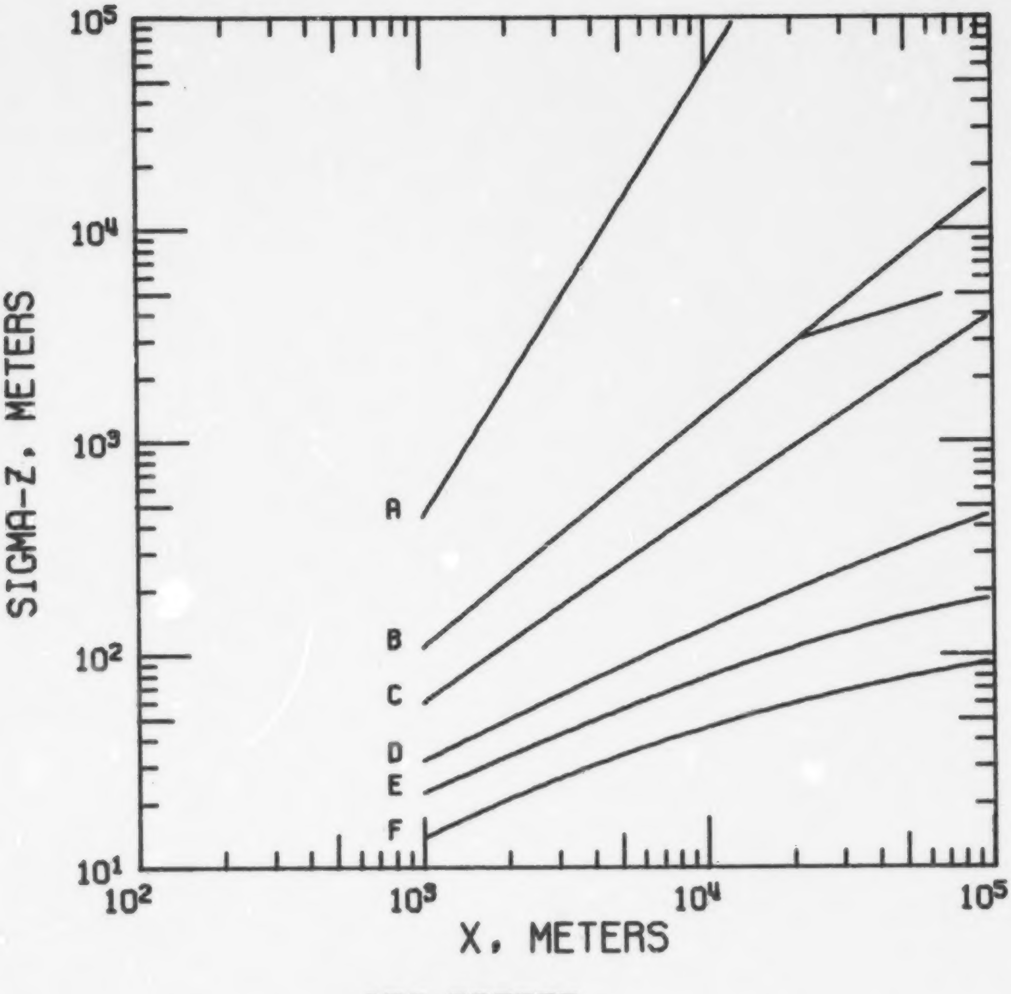
Figure 205.



SEA BREEZE

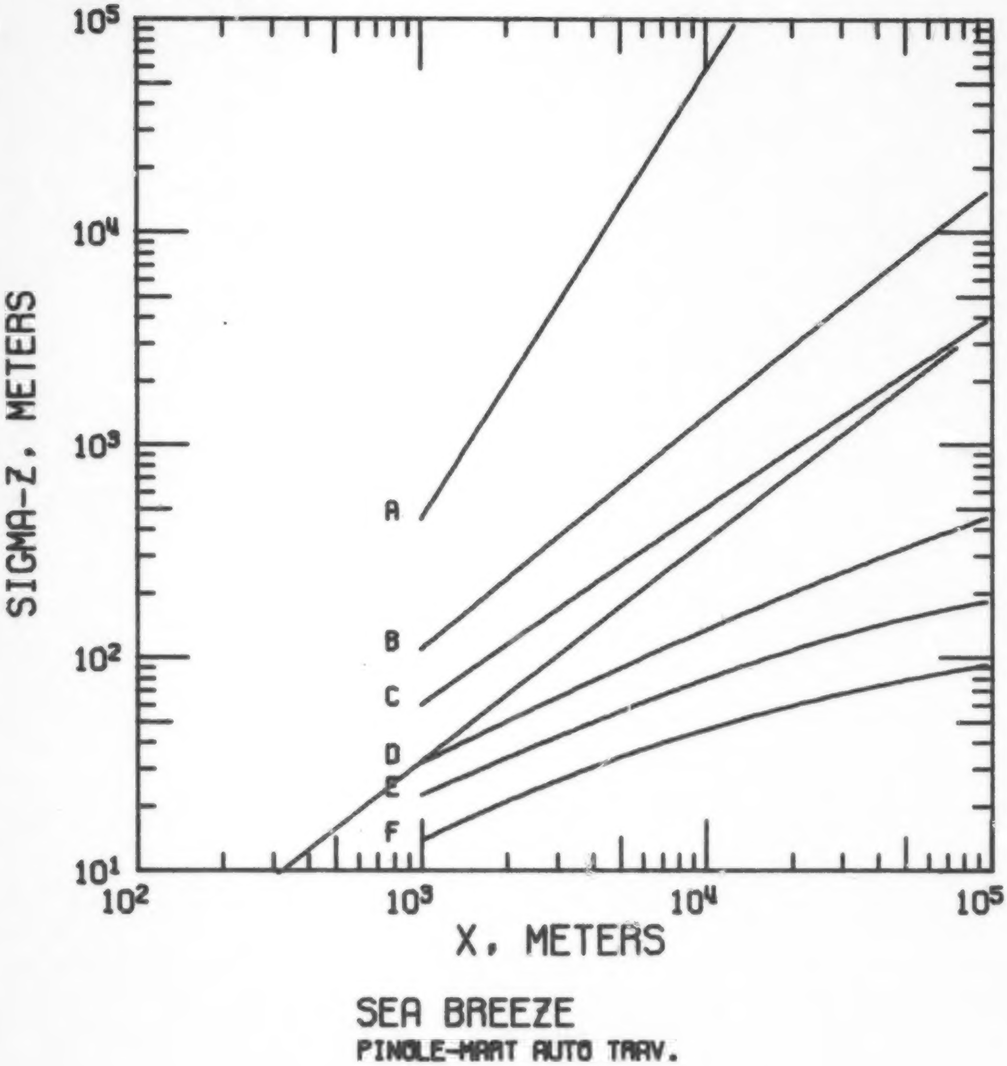
MARTINEZ AUTO TRAV.

Figure 206.



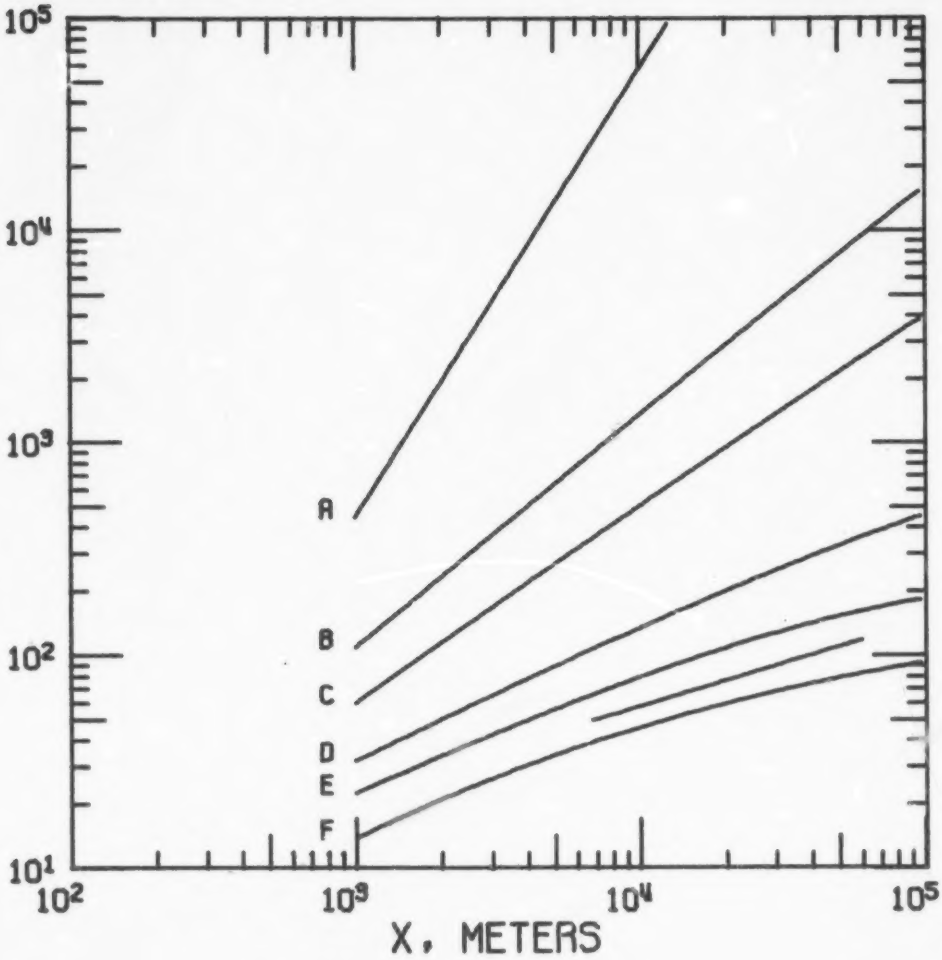
SEA BREEZE
PINOLE AUTO TRAV.

Figure 207.



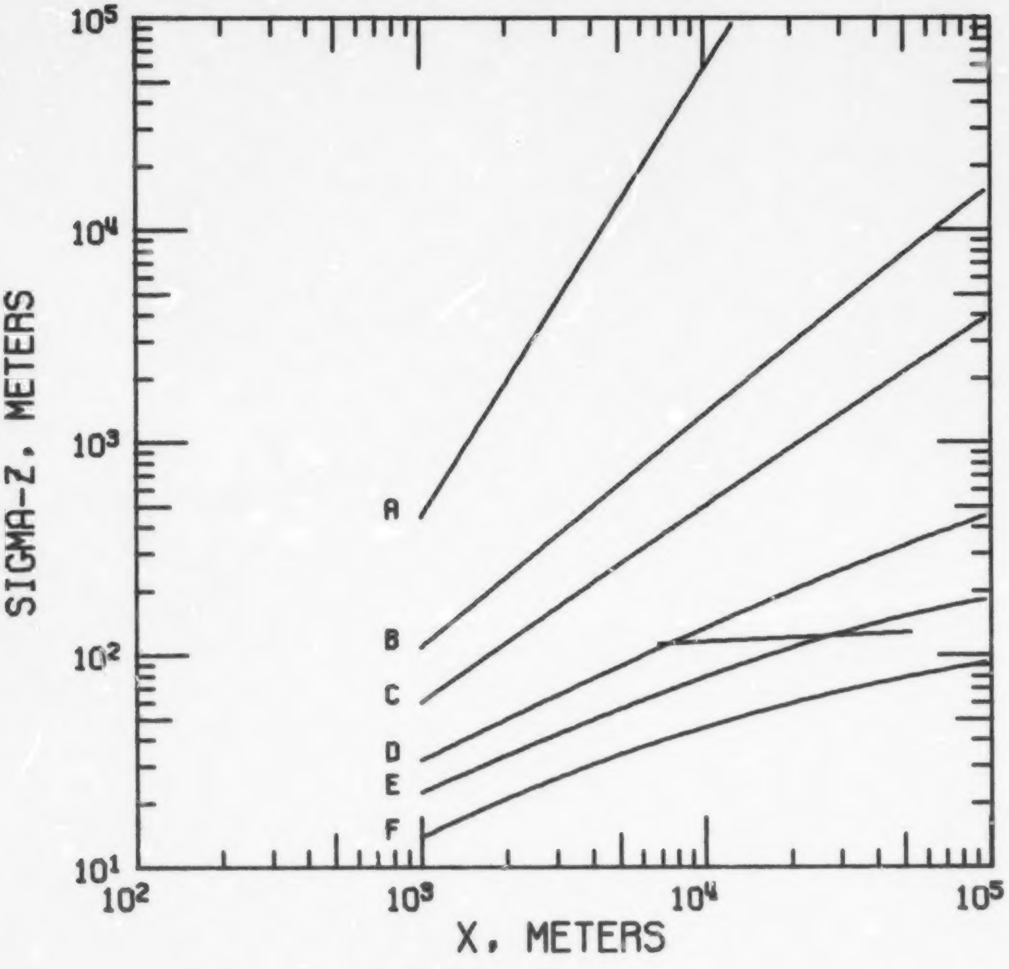
SEA BREEZE
PINOLE-MART AUTO TRAV.

Figure 208.



SEA BREEZE TAIL
DOW AUTO TRAV.

Figure 209.



NIGHTTIME
DOW AUTO TRAV.

4. Relationship of Dispersion Data to Wind Data

4.1 Fluctuations in the Horizontal Winds

Wind data from the Dow site at two heights, from Brentwood, and from a tower at the Rancho Seco Nuclear Power Plant provide a means of determining the hourly standard deviation of the horizontal wind, σ_θ, for the four locations. At Dow and Brentwood, σ_θ was calculated for an hour from 5-minute averaged observations; no information is available concerning the calculation procedure for the Rancho Seco data.

In the following figures σ_θ is plotted versus time of day for the eight test days at each location. Also shown are the values of σ_θ corresponding to the Pasquill stability classes. The measured values of σ_θ are tabluated in Section 6.1.

Figure 210.

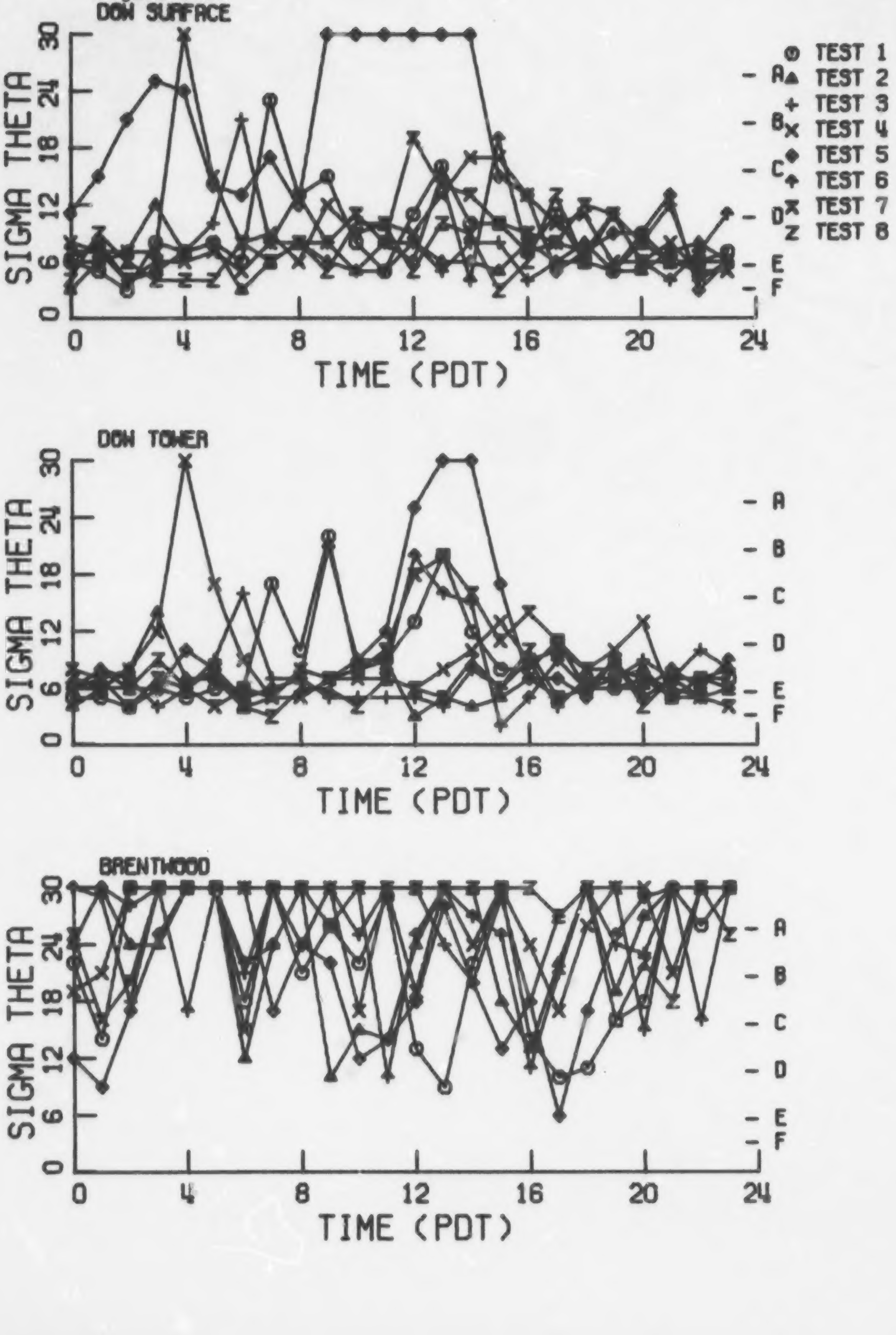
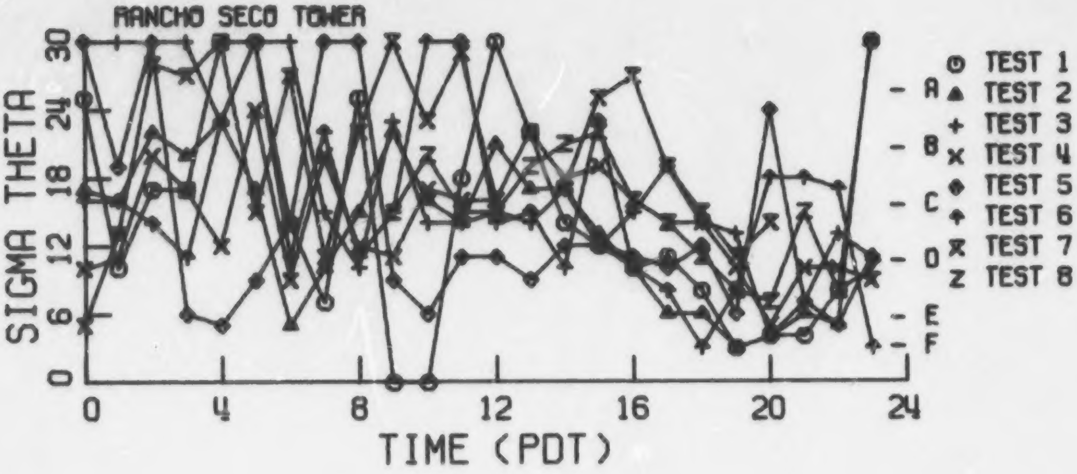

DOW SURFACE
SIGMA THETA
0
6
12
18
24
30
TIME (PDT)
0
4
8
12
16
20
24
A
B
C
D
E
F
TEST 1
TEST 2
TEST 3
TEST 4
TEST 5
TEST 6
TEST 7
Z TEST 8
DOW TOWER
BRENTWOOD

Figure 211.


RANCHO SECO TOWER
SIGMA THETA
0
6
12
18
24
30
TIME (PDT)
0
4
8
12
16
20
24
A
B
C
D
E
F
TEST 1
TEST 2
TEST 3
TEST 4
TEST 5
TEST 6
TEST 7
TEST 8

4.2 Horizontal Dispersion as a Function of Wind Fluctuations

The relationship between horizontal dispersion in terms of σ_y and wind fluctuations in terms of σ_θ can be determined from the tracer data. An idealized crosswind dispersion distance, A, may be defined as

$$A = X \cdot \tan \sigma_\theta \approx X \sigma_\theta$$

where X is the downwind distance and σ_θ is measured in radians. The value of A is one-half of the crosswind distance at X through which the plume centerline fluctuated over one hour. In the following figure, σ_y for each traverse is plotted as a function of $A(\sigma_\theta)$ for the value of σ_θ measured at the surface on the Dow site for the hour in which the traverse was taken.

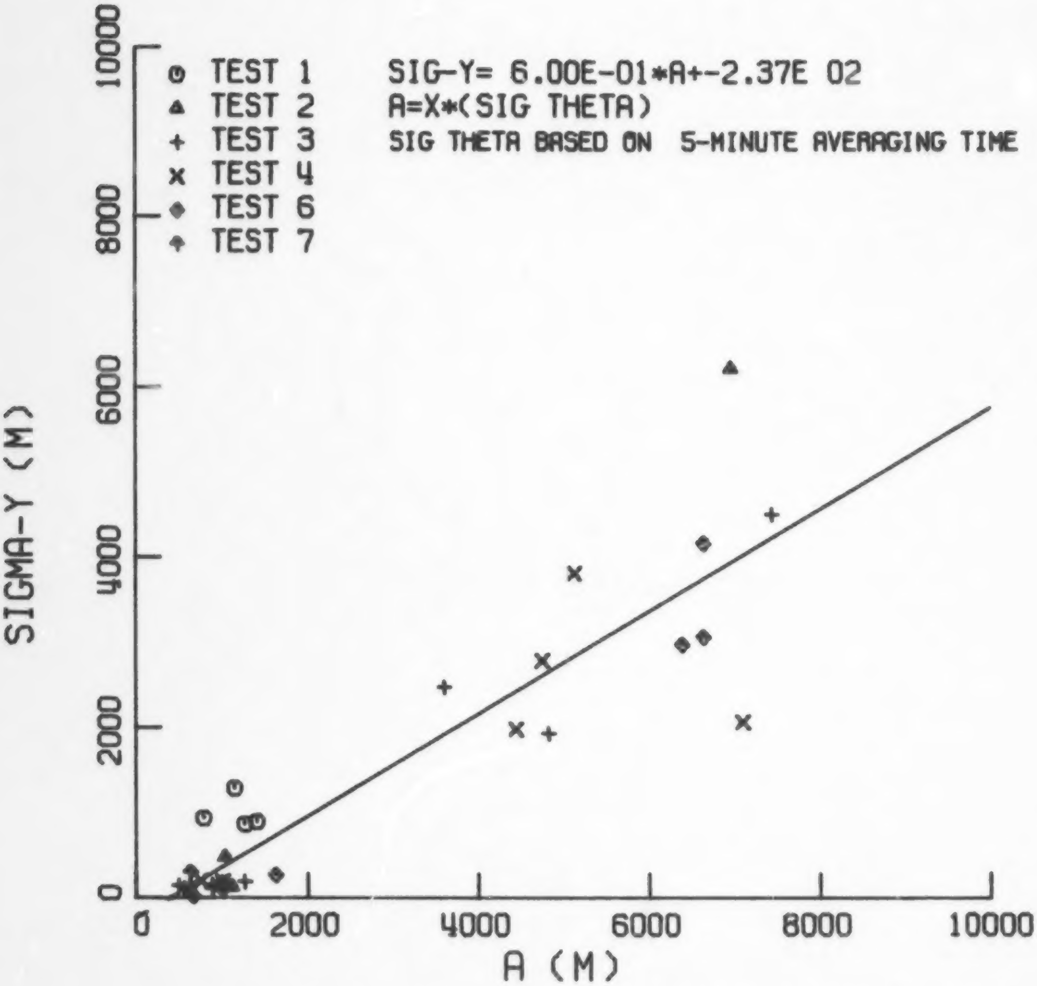


Figure 212. Horizontal Crosswind Standard Deviation (σ_y) as a function of the horizontal standard deviation of the wind (σ_θ) measured at the Dow site in the Montezuma Hills.

4.3 Atmospheric Stability Classification

Turner's (1961) method of determining stability class based upon wind speed and insolation was used to classify the stability for each test period. The average insolation or cloud cover, the average wind speed, the average mixing layer depth, and the resulting stability class are given in the following table. The average wind vector at the tracer release point during the release period is also given.

TABLE 11

AVERAGE METEOROLOGICAL CONDITIONS DURING FIELD TESTS

Test	Time PDT	L* m	u** deg/m/sec	u_r*** (release point)	Cloud cover	Stability class
1	1200-1800	960	300/3.4	270/5.3	clear	B-C
2	1100-1700	830	290/4.3	270/4.0 (Mart.)	clear	B-C
	1300-1500			270/9.2 (Dow)		
3	0000-0600	860	290/3.3	280/9.3	scattered	D-F
4	1800-0000	510	290/3.3	280/7.1	broken	D-F
5	1100-1500	1910	340/2.6	17/1.8	scattered	B-C
6	0500-1400	1250	270/1.2	280/6.3	overcast	D
7	0600-1900	830	280/2.3	240/2.6 (Pinole)	scattered	B-C
				270/4.6 (Dow)		
8	0700-1300	1200	250/3.6	220/3.7	scattered	B-C

* The average height of the mixing depth, L, was calculated from available hourly mixing depths for all stations over the indicated time period.

** The average wind direction and speed was obtained by vector averaging data from all downwind stations over the time indicated.

*** u_r is the average wind direction and speed at the tracer release point during the time of the release. Surface data from Rodeo (4 Km northeast of Pinole) were used for determining u_r at Pinole.

LITERATURE CITED

Moyer, N. California Air Resources Board, personal communication, 1977.

Turner, D. B. (1961), "Relationships between 24-hour mean air quality measurements and meteorological factors in Nashville, Tennessee," J. Air Poll. Contr. Assoc. 11, 483-489.

Turner, D. B. (1970), "Workbook of atmospheric dispersion estimates," Environmental Protection Agency, Research Triangle Park, North Carolina.